



INDOTWISE 5.0

MicroStation UI, Plans Processes & Imagery

Kuhn, Jason

indotcadsupport@indot.in.gov

Contents

| | |
|---|----|
| 1. The INDOT CAD Workspace in ProjectWise | 5 |
| 1.1 CAD Seed/Template Files | 5 |
| 1.1-1 INDOT_US_SVFT Seed Files | 6 |
| 1.1-2 DWG Creation Seed Files | 6 |
| 1.1-3 Real Estate Seed Files (2D only) | 6 |
| 1.1-4 Sheets | 7 |
| 1.1-5 Standards Seed Files | 7 |
| 1.1-6 Survey Seed Files | 7 |
| 1.2 Revised Template Sheet Models | 7 |
| 1.3 The ProjectWise Managed Workspace | 8 |
| 1.3-1 Managed Workspace Export | 8 |
| 1.3-2 Working with the Workspace | 9 |
| 1.3-3 INDOT Customized Fonts | 9 |
| 1.3-4 MicroStation and Files with SignCAD Fonts | 9 |
| 1.3-5 The MicroStation Platform, File -> Open and Workspace Reloads | 9 |
| 1.3-6 Text Styles | 10 |
| 1.3-7 Dimension Styles and Settings | 12 |
| 1.3-8 Levels | 14 |
| 2. MicroStation CONNECT Platform | 18 |
| 2.1 What's Different in the MicroStation CONNECT Platform | 18 |
| 2.1-1 Workflows | 18 |
| 2.1-2 Customizing the Ribbon Display | 26 |
| 2.1-3 Customizing the Quick Access Toolbar | 30 |
| 2.1-4 Dockable Dialogs | 31 |
| 2.1-5 The Backstage View (File Menu) | 35 |
| 2.1-6 Project Explorer – Links | 42 |
| 2.2 User Interface Enhancements | 44 |
| 2.2-1 Drag-and-drop Support | 44 |
| 2.2-2 Show/Hide Support in Status Bar | 46 |
| 2.2-3 Coordinates Display in Status Bar | 46 |
| 2.2-4 Locks Dialog | 47 |
| 2.3 Models Enhancements | 48 |

| | | |
|-------|---|----|
| 2.3-1 | View Different Models from the Same File in Each View | 48 |
| 2.4 | Text Enhancements..... | 50 |
| 2.4-1 | Change Case by Selection Set or Fence..... | 50 |
| 2.4-2 | Text Style dialog enhancements | 51 |
| 2.4-3 | Text Editor Enhancements | 52 |
| 2.4-4 | Using Fonts..... | 52 |
| 2.4-5 | Edit Text Tool Retains Text Settings | 53 |
| 2.4-6 | Disabling Text Field Backgrounds..... | 54 |
| 2.4-7 | Special Character Symbols | 54 |
| 2.5 | References Enhancements..... | 56 |
| 2.5-1 | Activate Reference for In-Place Editing | 56 |
| 2.5-2 | References Support Active Model Annotation Scale | 57 |
| 2.5-3 | Detail Scale..... | 58 |
| 2.5-4 | Synchronize with Saved View | 58 |
| 2.5-5 | Change Attachment Orientation..... | 58 |
| 2.5-6 | Reference Detail Scale | 58 |
| 3. | Imagery in MicroStation Platform – WMS and Map Insert | 59 |
| 3.1 | Introduction to WMS | 59 |
| 3.1-1 | Open Existing Map Definition | 59 |
| 3.2 | Map Insert Application..... | 62 |
| 4. | MicroStation Platform - Plans Production | 67 |
| 4.1 | Creating Sheets from DGN Template Documents | 67 |
| 4.1-1 | Creating a Title Sheet | 67 |
| 4.1-2 | Creating an Index Sheet | 70 |
| 4.2 | Resurface Plans | 72 |
| 4.2-1 | Ltr. Title Sheet | 73 |
| 4.2-2 | Ltr. Detail and Ltr. Landscape Detail | 76 |
| 4.2-3 | Ltr. Detour Sheet Signing | 78 |
| 4.2-4 | Miscellaneous Tables and Strip Maps..... | 78 |
| 4.3 | Traffic Plans Production | 82 |
| 4.3-1 | Signs Signals and Lighting Plans | 82 |
| 4.3-2 | Traffic Plans Creation | 83 |
| 4.4 | MicroStation Drawing/Model Names | 93 |

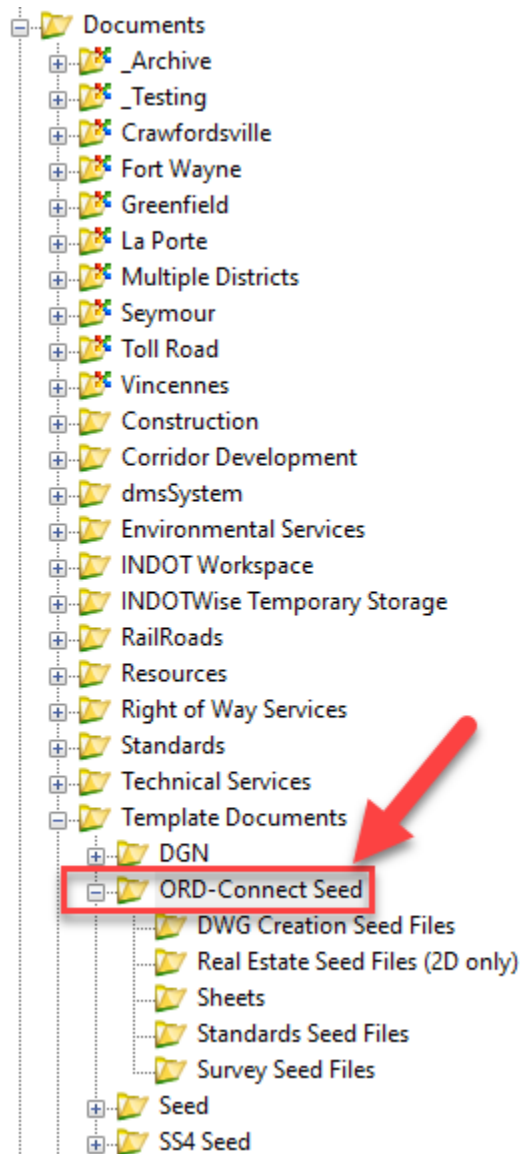
| | | |
|-----|---|-----|
| 5. | Working with References in the MicroStation Platform..... | 97 |
| 5.1 | Using References..... | 97 |
| 5.2 | Attaching References | 97 |
| 5.3 | Working with Nested References | 100 |

1. The INDOT CAD Workspace in ProjectWise

INDOT delivers workspace resources to the majority of INDOT employees using a ProjectWise Managed workspace. The following section covers a very high-level overview of what resources are directly available, and the usage experience that can be expected. These resources drive the INDOT specific tools, workflows, and resources that will be covered throughout the remainder of the MicroStation Platform UI discussion later in this module.

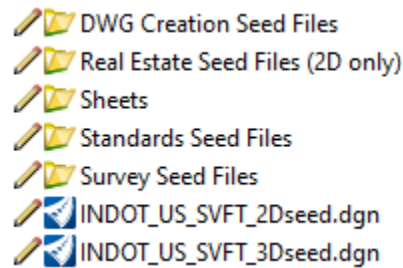
1.1 CAD Seed/Template Files

There are several seed/template files that are used to provide the foundation for the many types of CAD files that INDOT uses. These files can be found in the [ORD-CONNECT Seed](#) folder in ProjectWise under [Template Documents](#).



ORD-Connect Seed Folder Location in ProjectWise

Contained within this folder are several seed files that are categorized by the different use cases for them.



Contents of ORD-Connect Seed Folder

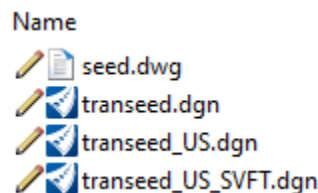
The remainder of this section will give a brief description of these seed files.

1.1-1 INDOT_US_SVFT Seed Files

The INDOT_US_SVFT seed files are the most commonly used seed files in the plans production process. The 2D version is often used by the Design group to create the foundation for their design files, while the 3D version is often used by the Survey group as the foundation for displaying their survey data to designers in CAD form.

1.1-2 DWG Creation Seed Files

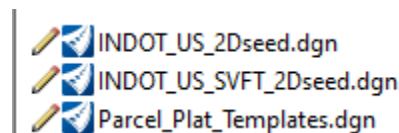
The seed files contained within the DWG Creation Seed Files folder assist the user when working with AutoCAD DWG files. If a DWG file needs to be created directly, a [seed.dwg](#) file is provided. If a DGN file needs to be created to bring in AutoCAD data into it, the various “transeed” seed files are provided.



DWG Creation Seed Files

1.1-3 Real Estate Seed Files (2D only)

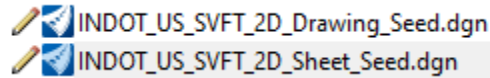
The Real Estate Seed Files folder contains the seed files most often used specifically by the Real Estate group.



Real Estate Seed Files (2D only)

1.1-4 Sheets

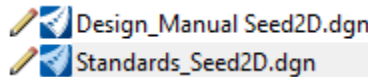
The Sheets folder contains the seed files used to create plan sheets. The [INDOT_US_SVFT_2D_Drawing_Seed](#) file is the base seed file for a drawing model, while the [INDOT_US_SVFT_2D_Sheet_Seed](#) file is the base seed file for a sheet model. Note that you should rarely have to use these seed files in this form—as they are already built into the sheet seeds that are utilized in the plans production process.



Sheets Seed Files

1.1-5 Standards Seed Files

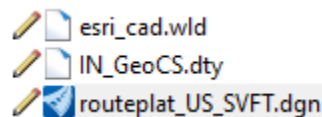
The Standards Seed Files folder contains the seed files specifically used by the Standards group. The file is used for the creation of content for the Design Manual, and the [Standards_Seed2D](#) file is used for the creation of standard drawings.



Standards Seed Files

1.1-6 Survey Seed Files

The Survey Seed Files folder contains the seed files most commonly used by the Survey group. The [esri_cad.wld](#) and [IN_GeoCS.dty](#) files assist the Survey group in applying geocoordination to their survey data, while the file assists the Survey in creating content for route plats.



Survey Seed Files

1.2 Revised Template Sheet Models

All INDOT CAD sheet models have been split into 2 separate files:

[D size sheets.dgn](#): All 24 x 36 (D size) sheet models now reside in this design file.

[Ltr sheets.dgn](#): All 8.5 x 11 (letter size) sheet models now reside in this design file.

In addition to separating the large format sheet models from the smaller ones, MicroStation's ability to convert units on the fly has allowed for the metric versions of these sheet models to be removed.

1.3 The ProjectWise Managed Workspace

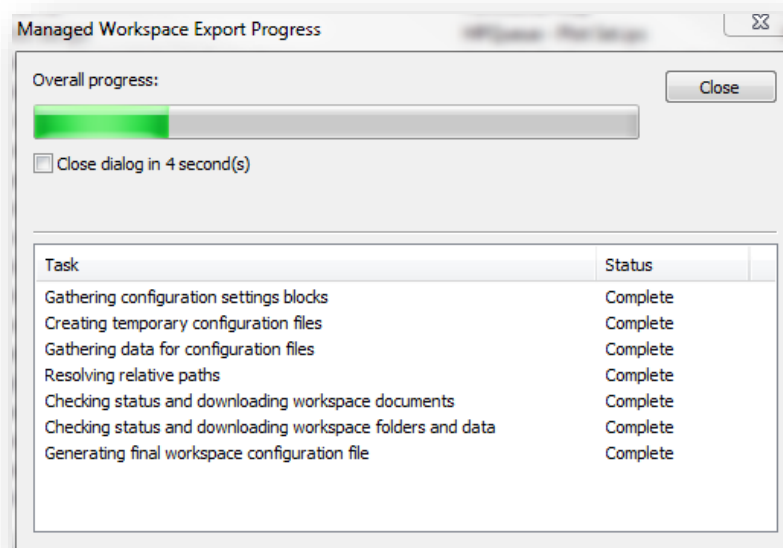
The Managed Workspace is a feature of ProjectWise that allows MicroStation workspace files to be managed within the ProjectWise environment. Benefits of doing this are that all workspace files are located and administered in a single location. This allows for the rapid deployment of updates and changes, while allowing flexibility in what and how workspace resources are accessed.

Note: *Be aware that if you are working outside of ProjectWise or for external users, are not using the INDOT Standalone Workspace, you will not have access to our managed workspace. As such, the INDOT-specific tools, levels, and customizations will not be available to you.*

1.3-1 Managed Workspace Export

The managed workspace attaches itself to any document opened by a MicroStation based application (MicroStation, OpenRoads Designer, etc.) from within ProjectWise. You can expect the managed workspace to be active when viewing/editing DGNs, DWGs, DXFs or any other file ProjectWise opens with a MicroStation based application such as OpenRoads Designer.

When opening CAD files from ProjectWise for the first time, you will see the following.



Managed Workspace Export Dialog

This is the Managed Workspace Export Progress dialog, and it shows the status of ProjectWise placing the workspace in your working folders. The first time you open a CAD file after the workspace has been initialized, this dialog will take a short amount of time to download all the relevant files and configure your workstation for the first time.

Subsequent file opens will reduce the amount of time required for the export to complete—as once the files have been downloaded, ProjectWise will only update them if there has been a change at the server. This ensures that you always have the most up-to-date workspace files available.

1.3-2 Working with the Workspace

Day to day use of the workspace has not changed in a visible manner. All toolboxes, macros, and symbology resources have been updated to automatically be available when you access your files. Areas where you may see differences are in the file paths where items such as cells are being attached from, or where you are initially directed to attach other resources.

Cells are loaded, on-demand resources in the workspace. They are not copied out the first time you run the workspace but are loaded when you access their icon in the toolbox. At this time, you may see a slight hesitation as ProjectWise is downloading the appropriate file to your PC. After this initial install, it will load instantly unless there has been a change to the file that causes it to be re-downloaded.

1.3-3 INDOT Customized Fonts

With the release of MicroStation V8i, Bentley no longer provides a method of maintaining and further customizing font resource files. Due to this limitation, INDOT customized fonts have been discontinued and we have instead moved to using true type fonts only. The benefits of this method are that files will seamlessly translate between CAD packages, and this will prevent the various other issues such as text rendering improperly or with the wrong character set.

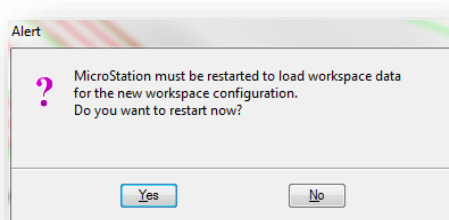
As such, the Office of Standards and Policy has provided CAD tech notes on how the special character cells that have been instituted as their replacement should be used in conjunction with the True Type fonts.

1.3-4 MicroStation and Files with SignCAD Fonts

With the removal of the legacy INDOT font resource file, the managed workspace is now configured to have the SignCAD fonts available on every project as there is no longer a conflict with existing resources.

1.3-5 The MicroStation Platform, File -> Open and Workspace Reloads

When opening files from the File -> Open command in a MicroStation platform product, you may be prompted with the following dialog:



Managed Workspace Prompt when Switching Files

This dialog denotes that there is a difference between the workspace you currently have loaded and the workspace options for the file you are attempting to open (most commonly a file based, reference path will change). In most instances the user can safely select No to proceed to their next file as most files now share the same workspace. One should consider however if they are switching from a MicroStation to an InRoads associated file, so the appropriate civil resources are loaded for these legacy file types and their associated operations.

1.3-6 Text Styles

This section will give an introductory description of what a MicroStation-based text style comprises, and then will cover the text styles that are currently included in the INDOT managed workspace.

1.3-6a What is a Text Style?

MicroStation supports text styles and provides an interface for constructing text using available system fonts and a wide variety of text attributes. A text style comprises a group of text attributes, such as font type, width, height, and color. Text styles enable you to place text within a model in a consistent and automated manner.

The following fonts are supported natively in MicroStation:

- Traditional MicroStation fonts
- TrueType fonts
- AutoCAD Shape fonts (.shx)

Tip1. Fonts are not embedded in the DGN file.

Tip2. If a Text Style changes in a Text Style library, Text Styles placed in DGN files prior to the change are not automatically updated in the DGN files. To update a DGN file to reflect the changes in the Text Style library, use the dgnlib to [Update from Library](#) from the text styles dialog.

1.3-6b INDOT Text Styles

INDOT has standardized the use of Tahoma font as the primary font used, except in limited circumstances. You will notice that the text styles are now using only True Type fonts—which gives us more flexibility with the Bold and Italics settings. The Bentley fonts will only be provided where necessary and will not be available for new projects. The following tables will show you the base settings for each text style provided as part of the INDOT Workspace.

| Text Style Name | Font | Height (in.) | Width (in.) | Notes/Guidelines for Use |
|---|-------------------|---------------------|--------------------|--|
| Text Styles for D-Size Plan Sheets | | | | |
| 10 Point Text | Tahoma | 0.10 | 0.10 | May be used for table data. |
| 10 Point Text (Survey Text) | Arial Narrow | 0.10 | 0.10 | (Color 225) Use for selected survey text. |
| 12 Point Text | Tahoma | 0.12 | 0.12 | Use for text callouts, dimensions, and notes. Minimum size for text placed on D-size plans other than text specified under 10 Point Text. |
| 14 Point Text | Tahoma | 0.14 | 0.14 | Use for selected text on title block, view subtitles, and column headings in tables. |
| 14 Point Text (Property Owners) | Bookman Old Style | 0.14 | 0.14 | Use for parcel-owner text only. |
| 18 Point Text | Tahoma | 0.18 | 0.18 | Use for detail and section titles, and table titles on detail sheets. |
| 30 Point Text | Tahoma | 0.30 | 0.30 | Use for selected text on title sheet of plans. |
| GIS Annotation – Full Size | Tahoma | 30 | 30 | Used for annotation of GIS Required elements and provided for legacy compatibility. |
| Text Styles for Ltr-Size Plan Sheets | | | | |
| 5 Point Text | Tahoma | 0.05 | 0.05 | |
| 6 Point Text | Tahoma | 0.06 | 0.06 | May be used for table data, existing-grade elevations on grid of plan and profile view, and selected survey text. |
| 7 Point Text | Tahoma | 0.07 | 0.07 | Use for selected text on title block. Column headings in tables, and parcel-owner text. |
| 7 Point Text (Survey Text) | Arial Narrow | 0.07 | 0.07 | (Color 222) Use for selected survey text. |
| 9 Point Text | Tahoma | 0.09 | 0.09 | Use for text callouts, dimensions, notes, column headings in tables, and parcel-owner text. Minimum size for all text placed on letter-size plans, other than text specified under 6 Point Text. |
| 12 Point Text | Tahoma | 0.12 | 0.12 | Use for selected text on title sheet of plans. |
| 14 Point Text | Tahoma | 0.14 | 0.14 | Use for detail and section titles, and table titles on detail sheets. |

INDOT Text Styles

NOTES:

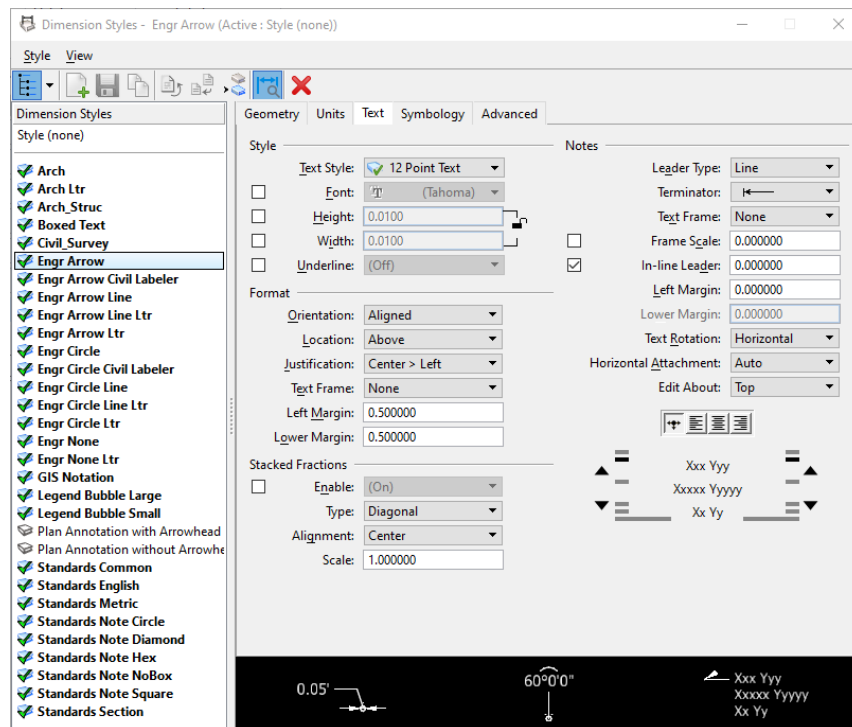
1. All styles are set to 0.65 (exact) line spacing.
2. All styles are Center-Center justified initially. Exceptions may exist for specific processes and are listed in parentheses such as (LT) – Left Top, (LB) Left Bottom, etc.
3. All styles are non-bold and non-italic and should remain so unless indicated otherwise above.
4. Variations of the 10 Point, 12 Point, and 14 Point Text styles have been created from their base text styles for use in annotation groups and/or civil labels.

(Values in the preceding chart are representative of a 1 to 1 scale)

There are additional styles provided from the Bentley default configuration. These named styles come from other application sources and are not used in the INDOT workflow and should not be removed as they are used as part of other default application configurations.

1.3-7 Dimension Styles and Settings

MicroStation dimension styles allow you to save dimension settings by name. This allows for greater unity between groups of dimensions in the file, as several different styles can be used for various models or portions of a model. Dimension styles are managed through the Dimension Styles Settings dialog box.



Dimension Styles

These dimension styles relate to the size of the text and are linked to the appropriate text style. The following tables will show you the settings for each dimension style that is used in the plans production process. *Note: Values in the chart below are representative of a 1 to 1 scale.*

| Dimension Style Name | Text Style | Units | Notes / Settings |
|--|----------------------------------|---|---|
| Dimension Styles for D-Size Plan Sheets | | | |
| Arch | 12 Point Text | MU label-SU label, round to nearest 1/16 | Arrow terminator, no text frame |
| Arch_Struc | 30 Point Text | MU label-SU label, round to nearest 1/16 | Arrow terminator, no text frame |
| Engr Arrow | 12 Point Text | MU label, round to nearest 0.01 | Arrow terminator, no text frame |
| Engr Arrow Civil Labeler | 12 Point Text | MU label, round to nearest 0.01 | Variation of Engr Arrow; used in civil labels. |
| Engr Arrow Line | 12 Point Text | MU label, round to nearest 0.01 | Arrow terminator, line text frame |
| Engr Circle | 12 Point Text | MU label, round to nearest 0.01 | Circle terminator, no text frame |
| Engr Circle Civil Labeler | 12 Point Text | MU label, round to nearest 0.01 | Variation of Engr Circle; used in civil labels |
| Engr Circle Line | 12 Point Text | MU label, round to nearest 0.01 | Circle terminator, no text frame |
| Engr None | 12 Point Text | MU label, round to nearest 0.01 | No terminator, no text frame |
| GIS Notation | GIS Annotation – Full Size | MU label, round to nearest 0.01 | Arrow terminator, no text frame |
| Dimension Styles for Ltr-Size Plan Sheets | | | |
| Arch Ltr | 9 Point Text | MU label-SU label, round to nearest 1/16 | Arrow terminator, no text frame |
| Engr Arrow Ltr | 9 Point Text | MU label, round to nearest 0.01 | Arrow terminator, no text frame |
| Engr Arrow Line Ltr | 9 Point Text | MU label, round to nearest 0.01 | Arrow terminator, line text frame |
| Engr Circle Ltr | 9 Point Text | MU label, round to nearest 0.01 | Circle terminator, no text frame |
| Engr Circle Line Ltr | 9 Point Text | MU label, round to nearest 0.01 | Circle terminator, no text frame |
| Engr None Ltr | 9 Point Text | MU label, round to nearest 0.01 | No terminator, no text frame |

NOTES:

1. All styles are set to use Working Units.
2. All styles are set to Dynamic Justify text notes.

1.3-8 Levels

In the current INDOT CAD production workspace, there are over 1250 levels. Due to this large number of levels, level filters can be used to limit the level list to only those levels needed. This section will cover how the levels are categorized, and then how to create level filters based on these categories.

1.3-8a Level Classifications

With the large number of levels that now exist in the INDOT CAD Workspace, a level naming scheme has been created to assist in filter creation—in addition to providing for consistent creation and categorization of levels.

Example: P_RDWY_Guardrail

- P_ - First Position Prefix, indicates that the level contains information related to Proposed work
- RDWY_ - Second Position Prefix, indicates that the level contains information related to Roadway Features
- Guardrail - Brief Description, indicates that the level contains line work specifically related to Guardrail

The table on the following page lists the level classifications that are currently in use in our workspace:

| First Position | Description | Second Position | Description |
|-----------------------|--------------------------------|------------------------|------------------------------|
| G_ | Ground Surface | SURF_ | Surface Features |
| P_ | Proposed | EW_ | Earthworks Features |
| RW_ | Right of Way | HY_ | Hydraulics Feature |
| S_ | Survey (TOPO) | RDWY_ | Roadway Feature |
| XS_ | Cross Section | ALG_ | Alignment |
| CG_ | COGO Points | BR_ | Bridge Features |
| PROF_ | Profile Features | CTRL_ | Survey Control |
| ST_ | Standards Drawings | DR_ | Drainage Features |
| PP_ | Plans Production | PROP_ | Property Features |
| BD_ | Border | RW_ | Right of Way |
| E_ | Existing Features (non-Survey) | TOPO_ | Topographical Features |
| CC_ | Construction | TRAF_ | Traffic Features |
| XT_ | Cross Section Template | UTIL_ | Utility Features |
| Draft_ | Drafting Elements | G_ | Graphical Feature |
| Drain_ | Drainage Elements | TC_ | Template Component |
| HY_ | Hydraulics Features | E_ | Existing Feature |
| Road_ | Roadway Barrier Elements | OBJT_ | Object (Standards Only) |
| | | ANNO_ | Annotation (Standards Only) |
| | | REFR_ | Reference (Standards Only) |
| | | TTLB_ | Title Block (Standards Only) |
| | | TXT_ | Text |
| | | SHT_ | Sheet |
| | | TL_ | Template Library |
| | | EC_ | Erosion Control |
| | | PVMT_ | Pavement |
| | | ENV_ | Environmental Feature |
| | | MD_ | Modeling |

Level Classifications in INDOT CAD Workspace

1.3-8b Level Filters

Filters are a useful way to group associated levels for the purposes of viewing or not viewing as a group. For example, you might have a DGN file with several hundred levels. Within these levels could be filters for different disciplines such as Bridge and Traffic. Within Bridge there might be levels for proposed or existing elements. You could easily define a filter called Bridge that would show only levels that would be associated with Bridge work.

Filters can be named, saved, and recalled as needed or defined on-the-fly for immediate one-time viewing using the Filter Row in the Level Manager dialog box. Filters can be turned on or off using the Level Display dialog box. Filters can be used to turn on or off levels across a model and all its attached models.

Levels can be filtered by several attributes such as filename, color, style, line weight, and level groups, to name a few. To display the levels that are defined in a filter, select the Active Level filter button from the Attributes toolbar and select the filter of choice. This will display those levels only and turn off all other levels in the dgn. Note that the levels will not actually be turned on or off, but the ability to view them in the Level Display will be dictated by the filter selected.

An updated set of level filters is available for use within the CAD Workspace. The table on the following page explains the qualifications for these filters:

| Filter Name | Description |
|------------------------------------|--|
| _IN Bridge | Level name contains _BR_ |
| Bridge - Existing | Level name starts with S_BR_ or E_BR_ |
| Bridge - Proposed | Level name starts with P_BR_ |
| _IN COGO | Level name starts with CG_ |
| _IN Cross Section Components | Level name starts with XS_TC_ |
| _IN Drainage | Level name contains _DR_ |
| Drainage - Existing | Level name starts with S_DR_ or E_DR_ |
| Drainage – Hydraulics | Level name starts with HY_DR_ |
| Drainage - Proposed | Level name starts with P_DR_ |
| _IN Erosion Control | Level name contains _EC_ |
| Erosion Control Proposed | Level name starts with P_EC_ |
| _IN Rehab | Custom Level filter as specified by Bridge Rehab |
| _IN Right of Way | Level name contains RW_ |
| Right of Way - Existing | Level name starts with S_RW_ or E_RW_ |
| Right of Way - Proposed | Level name starts with RW_ |
| _IN Roadway | Level name contains _RDWY_ |
| Roadway - Existing | Level name starts with S_RDWY_ or E_RDWY_ |
| Roadway - Proposed | Level name starts with P_RDWY_ |
| _IN Sheet Component | Level name contains BD_, PP_, XS_G_ |
| Sheet Component - Border | Level name contains BD_ |
| Sheet Component – Cross Section | Level name contains XS_G_ |
| Sheet Component – Plans Production | Level name contains PP_ |
| _IN Standards | Level name starts with ST_ |
| _IN Survey | Level name starts with S_ |
| Survey - Bridge | Level name starts with S_BR_ |
| Survey - Drainage | Level name starts with S_DR_ |
| Survey - Property | Level name starts with S_PROP_ |
| Survey - Right of Way | Level name starts with S_RW_ |
| Survey - Roadway | Level name starts with S_RDWY_ |
| Survey - Surface | Level name starts with S_SURF_ |
| Survey - Survey Control | Level name starts with S_CTRL_ |
| Survey - TOPO | Level name starts with S_TOPO_ |
| Survey - Traffic | Level name starts with S_TRAF_ |
| Survey - Utilities | Level name starts with S_UTIL_ |
| _IN Text Levels | Level names contain TXT, Text |
| _IN Traffic | Level names contain _TRAF_ |
| Traffic – Existing | Level names start with E_TRAF_ or S_TRAF_ |
| Traffic – Proposed | Level names start with P_TRAF_ |
| _IN Triangulation and Contours | Level name starts with G_SURF_ |

Level Filters in INDOT CAD Workspace

2. MicroStation CONNECT Platform

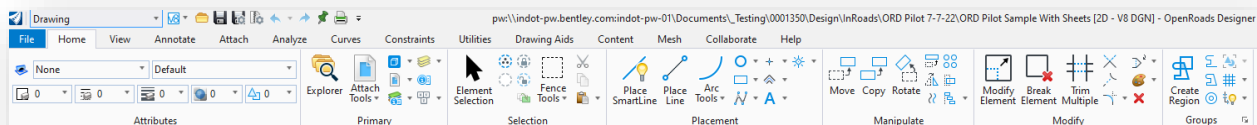
The following materials cover what is new in the MicroStation CONNECT Platform. For most agency users, OpenRoads Designer will be the product that provides the MicroStation Platform, and the following information will apply across that product as well as others such as OpenCities Map Power View. As this discussion covers the common components and interface updates, from MicroStation, these will be referred to as the MicroStation Platform. For a more in depth discussion of the changes to the UI and its functionality, please refer to the Bentley Learning Path: [QuickStart for MicroStation CONNECT](#).

2.1 What's Different in the MicroStation CONNECT Platform

The current MicroStation platform has introduced many changes to the user interface compared to previous versions. The goal of this chapter is to provide you with a guide to these interface changes and some of the options that you will see.

2.1-1 Workflows

At the top left of the interface, there is a Workflow dialog. This dialog essentially replaces the *Tasks dialog* that existed in previous versions. Each workflow contains all the necessary tools that are needed to perform the functions it is created for. This section will cover the general layout of a workflow, and some of the UI functionality. Following this will be a discussion of the custom INDOT Workflow agency specific settings and tools.



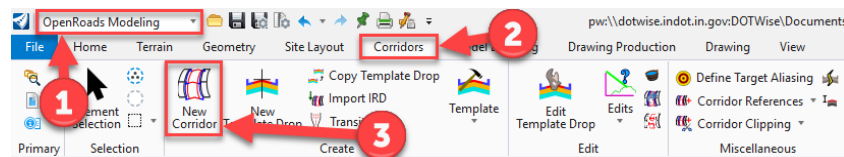
Drawing Workflow (all MicroStation Platform Products)

In the default setup of the INDOT Workspace, different workflows are visible depending on the product that is currently in use. The list on the following page names each workflow, and the application(s) it is associated with:

- OpenRoads Modeling (OpenRoads)
- OpenRoads Drawing Production (OpenRoads)
- Survey (OpenRoads Designer)
- Geotechnical (OpenRoads Designer)
- Reality Modeling (MicroStation, OpenRoads)
- Drawing (MicroStation, OpenRoads Designer, OpenCities Map)
- General (MicroStation)
- Task Navigation (MicroStation, OpenCities Map)
- Modeling (3D files only) (MicroStation, OpenRoads Designer, OpenCities Map)
- Visualization (3D files only) (MicroStation, OpenRoads Designer)
- SignCAD (if enabled) (MicroStation, OpenRoads Designer, OpenCities Map)
- Drainage and Utilities (OpenRoads Designer)
- INDOT Tools (MicroStation, OpenRoads Designer, OpenCities Map)

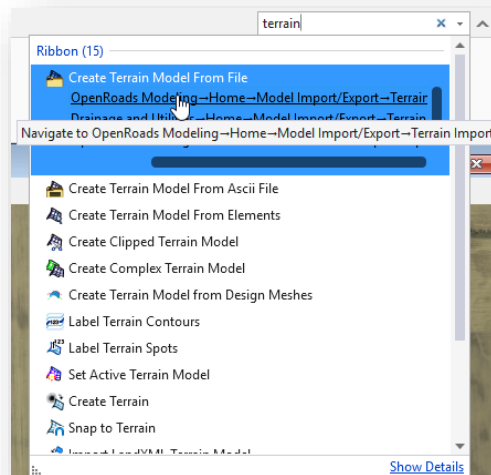
2.1-1a Workflow Layout

Each workflow consists of a group of tabs in the Ribbon (like the Microsoft Office user interface) that summarize the tasks needed to perform the workflow. Then, each tab contains “Groups” of tools that perform those tasks. For example, to create a new corridor using OpenRoads Designer, the user would navigate to the OpenRoads Modeling workflow, then the Corridors tab, and then the New Corridor tool in the Create Group.



OpenRoads Modeling Workflow > Corridors tab > New Corridor

To assist with finding tools in this new interface, it is suggested to utilize the Search field in the top right of the application window. As an example, say a user wants to search for where the tool is for creating a terrain model from a file. The term “terrain” can be entered into the Search field, and the search results will produce all the tools that have “terrain” in its name. Then to take it a step further, if the mouse pointer is hovered over the search result, a list of navigation paths will appear that will—when clicked on—take the user to the workflow where the tool resides and pre-select the tab where it resides.

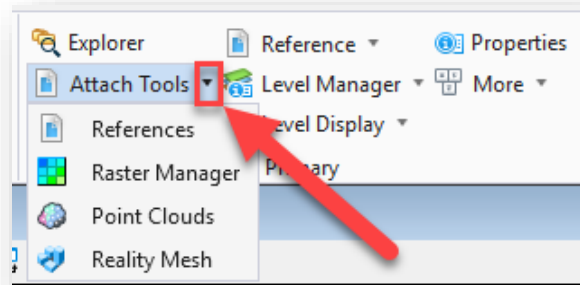


Searching for Tools in OpenRoads Designer

As shown above, tools can often be found in more than one location, as certain tabs/tools are applicable to more than one workflow—such as the Drawing and Drawing Production tabs, which are present in several of the workflows.

Tool Dropdown Menus

Several tools in the MicroStation Platform interface have dropdown arrows adjacent to them—and clicking on them will produce a menu showing various options. Below is an example of what happens when the dropdown arrow adjacent to the Attach Tools button in the Primary Group is clicked:

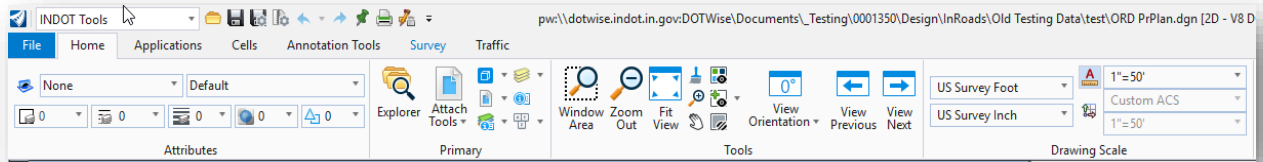


Attach Tools Dropdown

Be aware that some tools may just have a corresponding flyout menu associated with them, while others—such as the Attach Tools dropdown shown above—have secondary tools listed in them.

2.1-1b INDOT Tools Workflow

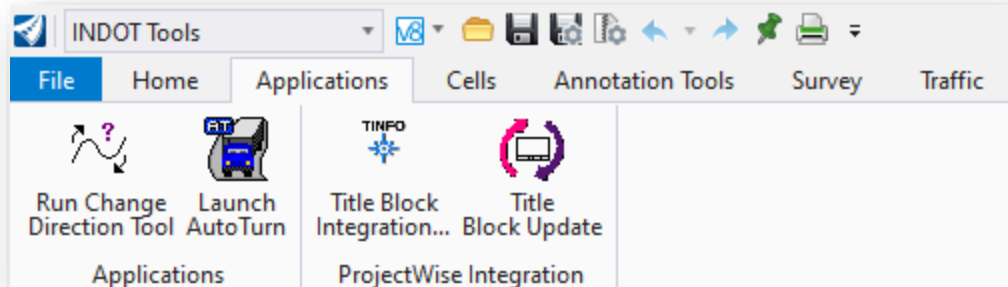
The INDOT Tools workflow contains INDOT-specific tools that are specific to our workspace. From this workflow, users can launch the AutoTurn application, add title block integration, connect to our cell libraries, among many other tasks.



INDOT Tools Workflow

Each entry in the ribbon will be discussed in the following sections. What you will find is a mix of tools, preconfigured settings, and utility launchers that correspond to several functions specific to the INDOT CAD Workspace.

Applications

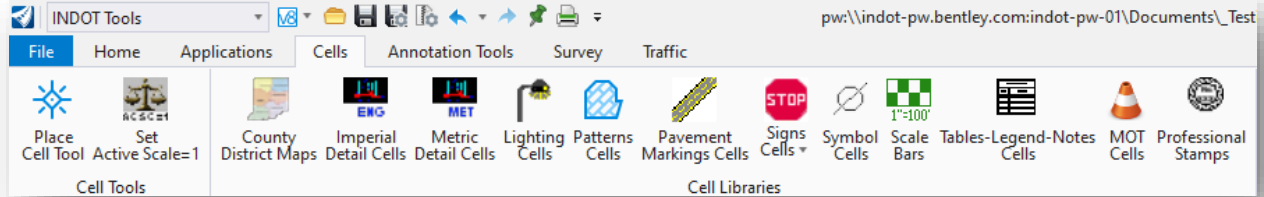


The Applications Ribbon

On the applications ribbon you can find a series of small tools and launchers for the following:

- Run Change Direction Tool – Used to change the direction of base MicroStation Platform elements, this should not be run on elements created with any Civil data such as alignments, there are dedicated tools for these functions where necessary.
- Launch AutoTurn – Used to launch the AutoTurn turning radius application that runs within the MicroStation Platform.
- Title Block Integration Cell – Used to directly attach the cell library for the cells used for title block tags. This should only be used in conjunction with the CAD Support team as multiple placements of these cells can cause issues when title block text is resolved from ProjectWise.
- Title Block Update – Used to update the title block of plan sheets with the latest project attributes pulled from ProjectWise.

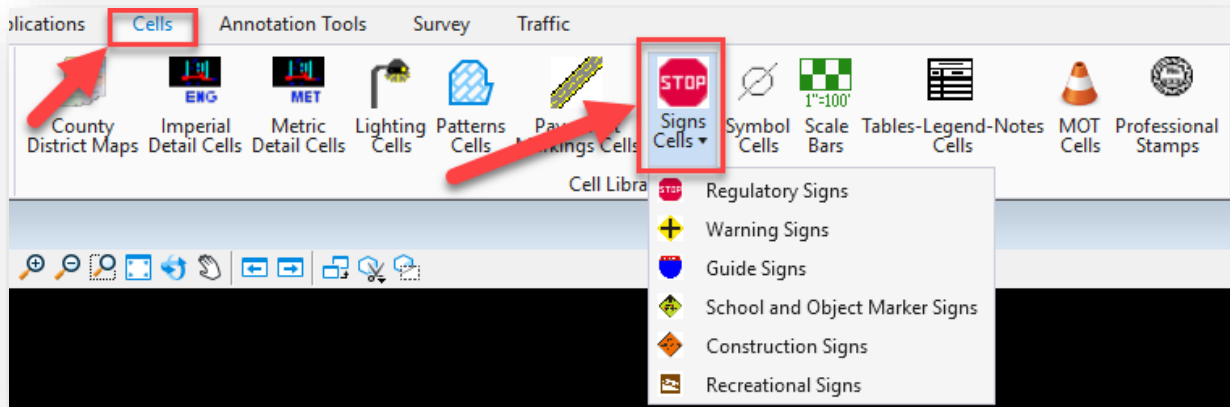
Cells



The Cells Ribbon

On the cells ribbon, you can find the following cell related options:

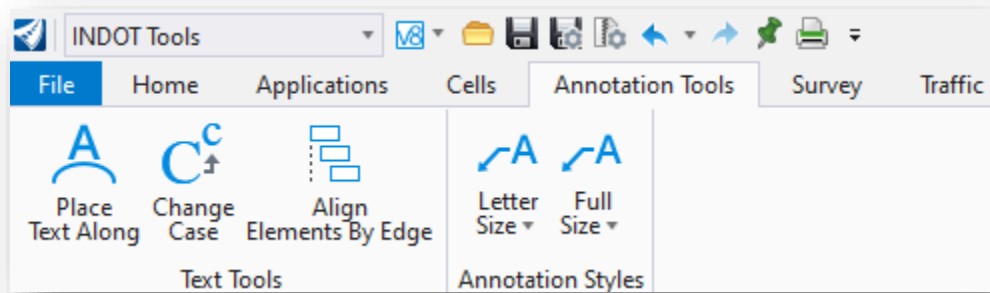
- Place Cell Tool – Launches the MicroStation Platform Place Cell dialog with the currently active cell library.
- Set Active Scales=1 – Sets the active scale for the current model to 1 for the X,Y, and Z coordinates. All cell placement relies on these scales, and this allows to quickly reset depending on need.
- Country District Maps – Attaches the county and district map library for use on title sheets.
- Imperial Detail Cells – Legacy design detail cells in imperial units. Note that these are provided as reference from prior versions of the CAD workspace and elements/styles may not adhere to current workspace conventions.
- Metric Detail Cells – Legacy design detail cells in metric units. Note that these are provided as reference from prior versions of the CAD workspace and elements/styles may not adhere to current workspace conventions.
- Lighting Cells – Cells primarily used for sign, signals, and lighting plans.
- Patterns Cells – Basic pattern cells used for filled shapes.
- Pavement Markings Cells – Cells used to place pavement markings.
- Signs Cells – Cell libraries of agency signage used to place signs without necessitating the usage of SignCAD. A dropdown menu of the various libraries is available to attach specific categories.



Signs Cells Dropdown Menu

- Symbol Cells – Common drafting symbols
- Scale Bars – A variety of preconfigured scale bars.
- Tables-Legends-Notes Cells – Mixed text/table components created for placement on CAD drawings.
- MOT Cells – Maintenance of Traffic cells
- Professional Stamps – Agency PE stamps for quick placement. Agency users only.

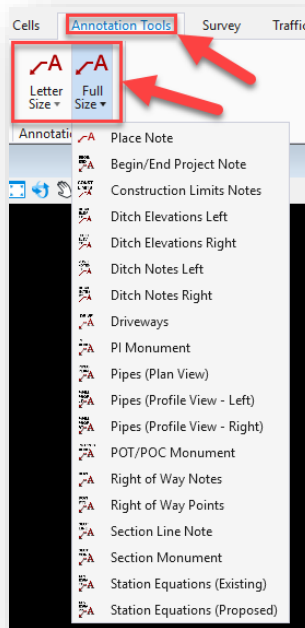
Annotation Tools



The Annotation Tools Ribbon

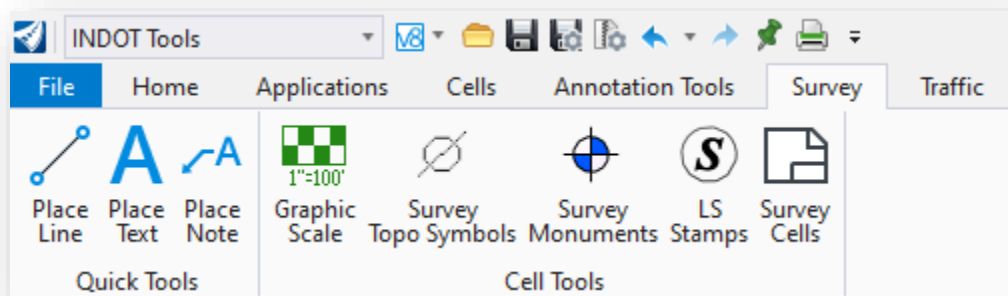
The Annotation Tools ribbon contains the following items:

- Place Text Along – Allows for the placement of text along a MicroStation Platform adjusting its orientation to follow the element path.
- Change Case – Quickly change the case of already placed text.
- Align Elements By Edge – Allows for the alignment of multiple CAD elements to align to another existing element. Commonly use with items such as station offset annotations to align text to the border frame.
- Annotation Styles Letter and Full Size – These are a series of prebuilt annotations using the place note and place text tools using workspace text styles, dimension styles, and symbology.



Letter Size and Full Size Dropdown Menus

Survey

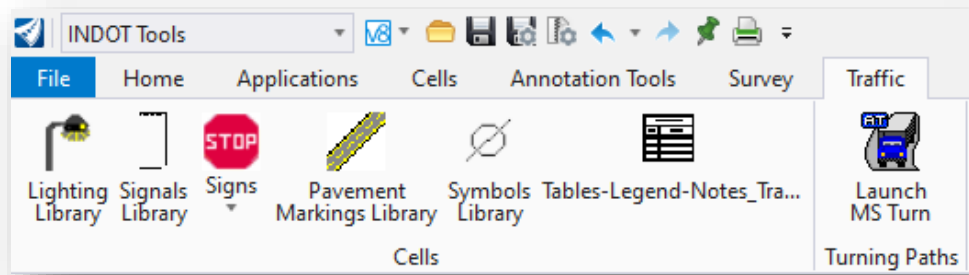


The Survey Tools Ribbon

The following can be found on the Survey Tools ribbon:

- Place Line, Text and Note – These are the base MicroStation Platform commands placed for quick access.
- Graphic Scale – Survey specific scale bar cells.
- Survey Topo Symbols – Cell library containing survey TOPO symbols for manual placement.
- Survey Monuments - Cell library containing survey monument symbols for manual placement.
- LS Stamps - Agency LS stamps for quick placement. Agency users only.
- Survey Cells – Survey sheet and reference card components for placement as cells.

Traffic



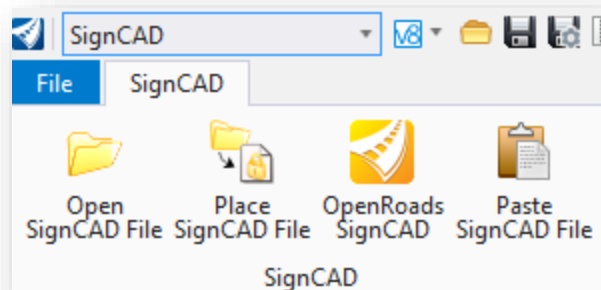
The Traffic Ribbon

In the Traffic Ribbon you can find the following items:

- Lighting Library – Cells specific to lighting operations.
- Signals Library – Cells specific to signals operations.
- Signs – Signage cell libraries, please see the earlier section on Cells ribbon for more detail.
- Pavement Markings Library – Cells used to place pavement markings.
- Symbol Cells – Common drafting symbols
- Tables-Legends-Notes Cells – Mixed text/table components created for placement on CAD drawings.
- Launch AutoTurn – Used to launch the AutoTurn turning radius application that runs within the MicroStation Platform.

2.1-1c The SignCAD Workflow

The SignCAD workflow is a single ribbon of 4 commands. These all relate to the placement of SignCAD signs within the MicroStation Platform.



The SignCAD Workflow/Ribbon

- Open SignCAD File – Opens a SignCAD file (.sgn) and creates a new DGN of it.
- Place SignCAD File – Places a SignCAD file in the current model, like placing a cell.
- OpenRoads SignCAD – Opens SignCAD
- Paste SignCAD File – Configures settings for placement/conversion of SignCAD files into MicroStation Platform.

2.1-1d OpenRoads Workflows

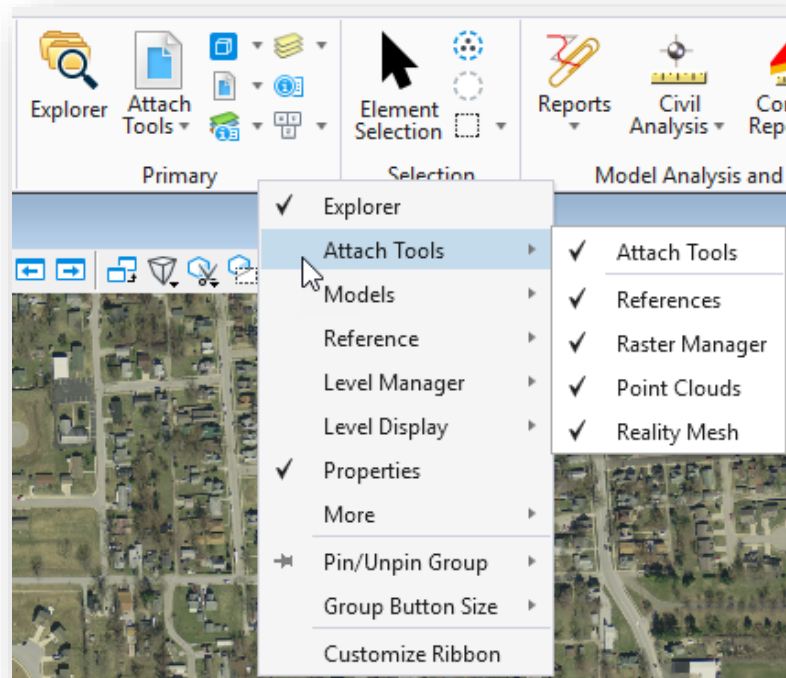
For a discussion of the additional workflows that are made available in OpenRoads Designer, please refer to the DOTWise 5.0 ORD Plans Production Documentation which covers these tools along with their usage.

2.1-2 Customizing the Ribbon Display

The Ribbon in the MicroStation Platform can be customized in several ways. One way to accomplish this is to right-click anywhere within a Ribbon Group, which presents a menu with several options to customize its display. The second way is to directly access the Customize Ribbon dialog, which is discussed at the end of the section.

2.1-2a Customizing the Tools Displayed in a Ribbon Group

The top section of the Ribbon Group's menu lists all the tools that are associated with it.

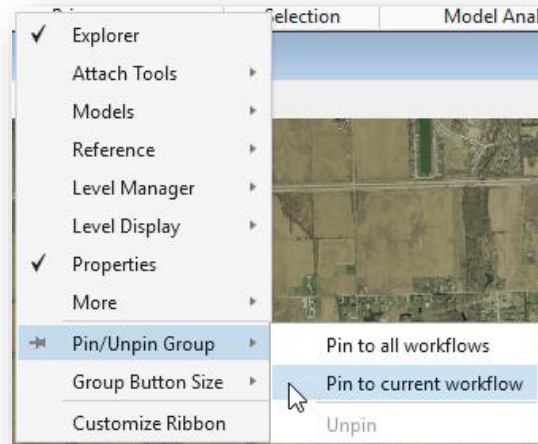


Ribbon Group Tools

In the above example, a right-click within the Primary Ribbon Group presents a menu as shown. The tools listed with a check mark next to them are already being displayed. As such, the tool display in the Group can be turned on and off as desired.

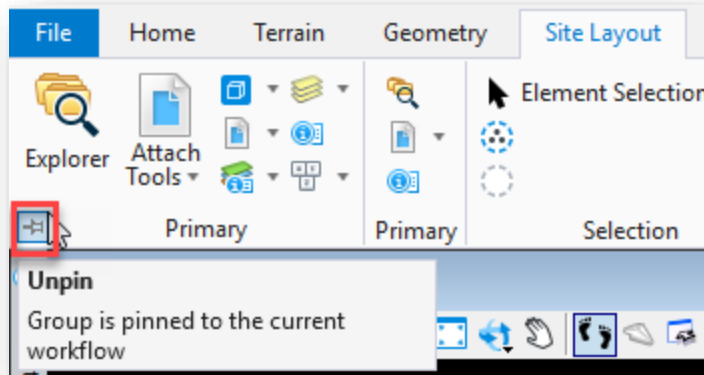
2.1-2b Customizing the Display of Ribbon Groups

The Pin/Unpin Group option allows the user to pin (display) a Group in either a) every tab in all workflows, or b) every tab in just the current workflow.



Pinning a Group to Workflows

Note that when a Group is pinned, it is placed on the left side of the Ribbon for each tab. Also note the icon indicating that is pinned.

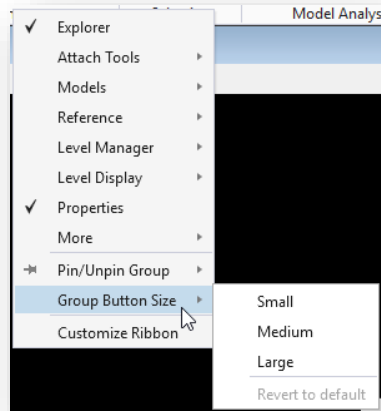


Pinned Group

To unpin the Group, the user can either click on the icon as shown above or selecting the Unpin option in the Ribbon Group's menu.

2.1-2c Customizing Button Sizes

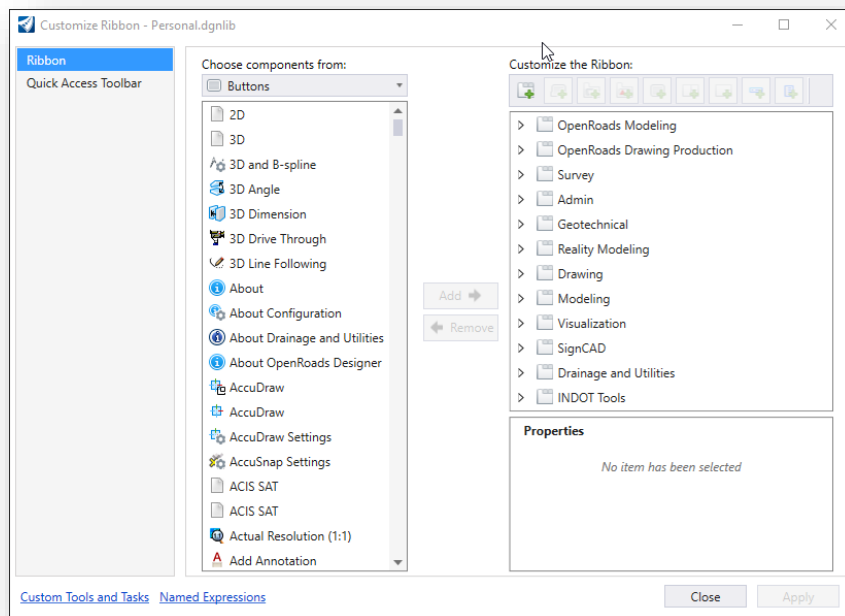
To customize the button sizes in a Ribbon Group, navigate to the Group Button Size option in the Ribbon Group's menu and select the desired size: Small, Medium, or Large. To bring the sizes back to their defaults, select the "Revert to default" option.



Customizing Button Size in a Ribbon Group

2.1-2d The Customize Ribbon Dialog

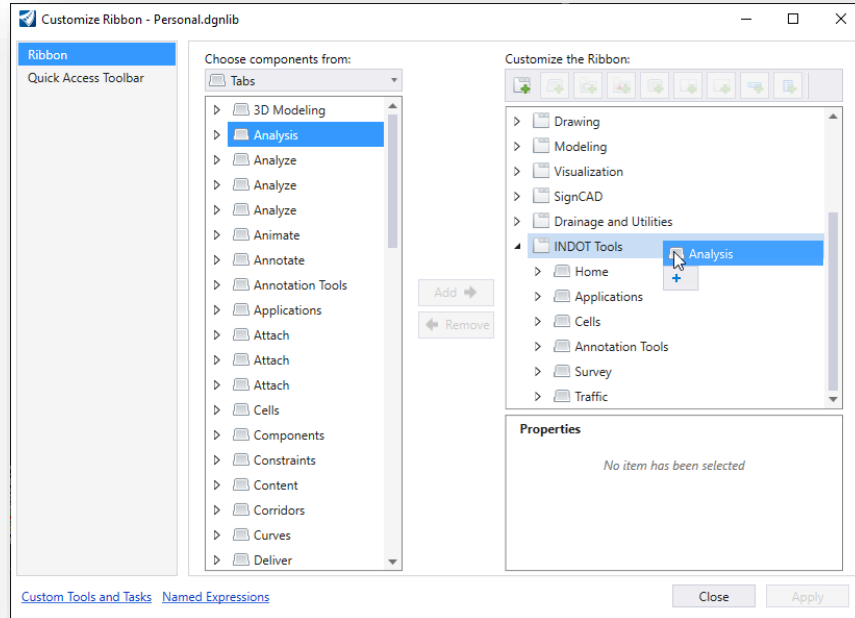
Selecting Customize Ribbon from the Ribbon Group's menu will open the Customize Ribbon dialog.



Customize Ribbon Dialog

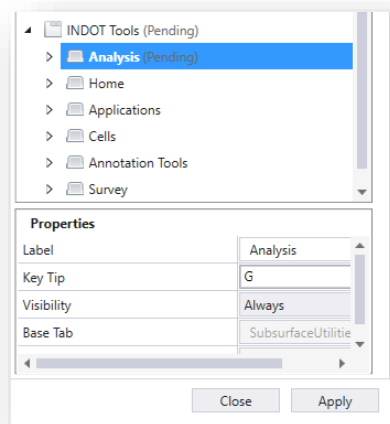
NOTE: This can also be accessed by clicking on the File tab in the Ribbon and then clicking on Settings > User > Customize Ribbon button.

From the Customize Ribbon dialog, a user can customize their Ribbon display by adding and/or removing components (Ribbon Groups, tabs, individual buttons, etc.) to/from it. To add a component to the user interface, the component first needs to be selected in the “Choose components from:” section of the dialog. Then that component needs to be brought over to the desired location in the “Customize the Ribbon:” section via click and drag. In the example below, the Analysis tab is being brought into the INDOT Tools workflow.



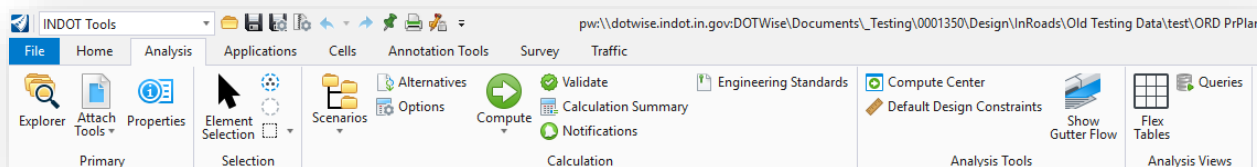
Adding a Tab to a Workflow via Customize Ribbon Dialog

Once added, the INDOT Tools workflow and the Analysis tab both have a (Pending) designation in the Customize the Ribbon section.



Pending Changes in Customize Ribbon Dialog

This is indicating that the changes being proposed are still pending. Click on the Apply button to confirm the changes. After completion of processing, the Analysis tab is now added to the INDOT Tools workflow.



Analysis Tab Added to INDOT Tools Workflow

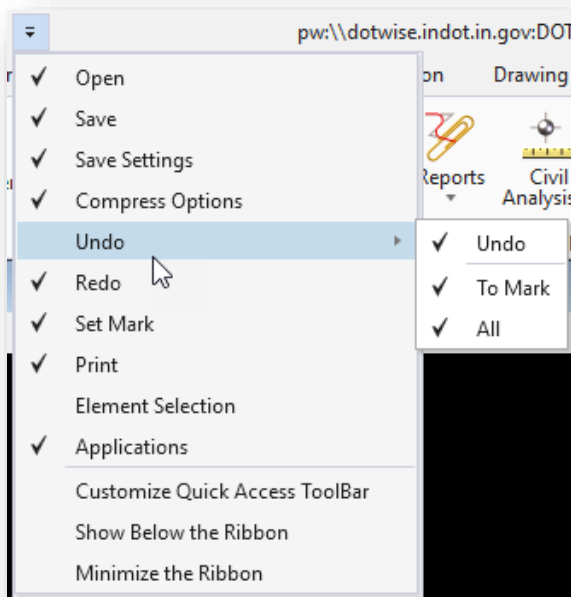
2.1-3 Customizing the Quick Access Toolbar

In much the same way as for the Ribbon, the Quick Access Toolbar—located next to the Workflow dialog—can also be customized.



Quick Access Toolbar

Clicking on the button on the far right of the toolbar brings up a menu like that of a Ribbon Group's menu—to where the display of tools/options can be turned on and off as desired. Options are also available to show the toolbar below the Ribbon, or to minimize the Ribbon entirely.



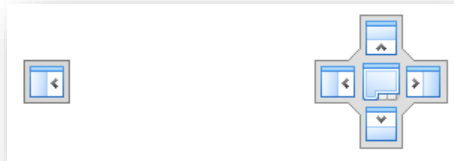
Quick Access Toolbar Menu

2.1-4 Dockable Dialogs

To gain more screen space, there are many dialogs that you can dock to the edges of the MicroStation platform application window.

2.1-4a To Dock a Dockable Dialog

1. Select a dockable dialog's title bar. Most dialogs in the MicroStation platform can be docked, and if they are able to, docking indicators like the below example will be displayed.

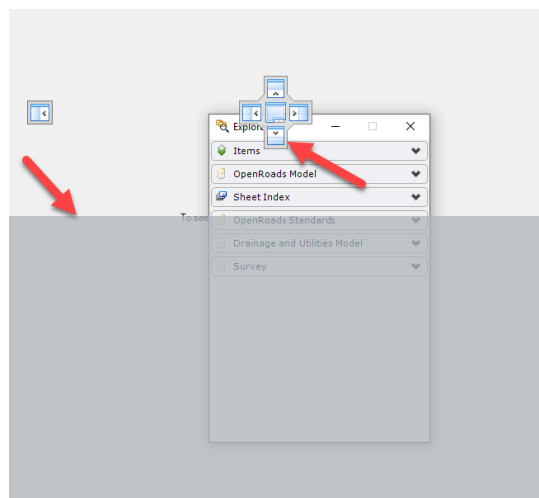


Single Docking Indicator (Left) & Full Docking Indicator (Right)

2. Drag the dialog over one of the docking indicators that appear in the center of the screen or along the edges of the application window.



3. As soon as you begin to drag a dockable dialog, a transparent block representing the dialog is attached to your pointer and moves with the pointer until you release the mouse button.
4. Place the pointer over one of the docking indicators. This highlights the available docking region along the corresponding edge of the application window.



Bottom Docking Indicator with Possible Docking Region

5. Release the mouse button. The dialog is docked within the selected docking region and is displayed in its entirety.

2.1-4b To Turn on Auto Hide for a Docked Dialog

1. Dock a dockable dialog to an edge of the application window.
2. Click the Auto Hide (pushpin) icon in the upper-right corner of the docked dialog. The docked dialog disappears, and a roll-out tab appears in its place along the same edge of the application window.



2.1-4c To Turn off Auto Hide for a Docked Dialog

1. Place the pointer over a docked dialog's roll-out tab.
2. While the dialog is displayed, click the Auto Hide icon. The dialog is re-docked along the same edge of the application window.



2.1-4d To Undock or Float a Docked Dialog

Double-click the title bar of a docked dialog. The dialog returns to the position in which it was last floating.

2.1-4e To Re-dock a Floating Dockable Dialog

Double-click the title bar of a floating dockable dialog which has been docked at least once. The dialog returns to the location where it was last docked.

2.1-4f To close a docked dialog

If the dialog is docked, simply click the dialog's Cancel icon (next to the Auto Hide icon). If Auto Hide is enabled, first pause the pointer over a docked dialog's roll-out tab, then while the dialog is displayed, click the dialog's Cancel icon, or simply enter the key-in that is normally used to close the dialog.

If you close a dialog while it is docked, and later click the icon or enter the key-in that normally opens the dialog, the dialog will open again to the position it was last docked.

If a dialog is docked when MicroStation exits, it will be docked in the same position the next time you start the product.

2.1-4g List of Dockable Dialogs

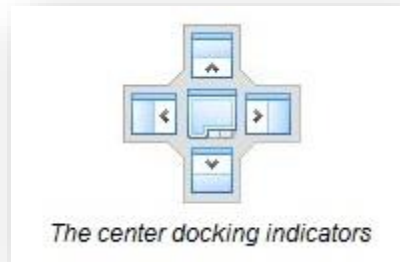
The following is the list of dockable dialogs, and which edges they can be docked to:

- Tool Settings window (left or right)
- Element Information dialog (left or right)
- Project Explorer dialog (left or right)
- Link Sets dialog (left or right)
- Tasks dialog (left or right)
- Markups dialog (left, right, top, or bottom)
- Item browser (left or right)
- Details dialog (left, right, top, or bottom)
- Feature Manager dialog (left or right)
- References dialog (top or bottom)
- Raster Manager dialog (top or bottom)
- Models dialog (top or bottom)
- Saved Views dialog (top or bottom)
- Level Manager dialog (top or bottom)
- Level Display dialog (left, right, top, or bottom)

The way in which you dock one of these dialogs is different from the way in which you dock a toolbox.

2.1-4h Using Docking Indicators

As you drag a dockable dialog, docking indicators appear on the screen. These docking indicators indicate which edges of the application window the selected dialog can be docked to. In most cases, a dockable dialog can only be docked either horizontally or vertically; however, some dialogs, like the Level Display dialog, can be docked both horizontally and vertically.



If the selected dialog can be docked horizontally, then the docking indicator at the center of the screen will have arrows that point toward the top and bottom edges of the application window, and matching docking indicators appear along the top and bottom edges. If the selected dialog can be docked vertically, then the docking indicator at the center of the screen will have arrows that point toward the left and right edges of the application window, and matching docking indicators appear along the left and right edges.



You can release the dialog over any of these arrows, and the dialog will be docked to the corresponding docking region. While it is mostly a matter of preference whether you use the docking indicator at the center of the screen or the ones at the edge of the application window, there is a slight difference in the two.

Using the center docking indicators will position the dialog so that it takes up the remaining free space along the length of the selected edge of the application window. For example, if there is already a dialog docked vertically on the left edge of the application window, then dropping a horizontally docking dialog over the center docking indicator, pointing toward the top edge of the application window, will dock the dialog so that it fits in the remaining space along the top edge.

Using the docking indicators at the edges of the application window let you decide where specifically along the selected edge you want to dock the dialog. For example, if there is already a dialog docked to the left edge, you can use the edge docking indicators to select whether you want to dock the new dialog on top of the existing dialog, or to the left or right of it, or above or below it.

If you are moving a dockable dialog and there are no dockable dialogs currently docked to the edge of the application window that the selected dialog can be docked to, then the center controls will not display.

2.1-4i Other Dialogs that can be Docked

The following dialogs are also dockable; however, their docking behavior follows the standard docking behavior for toolboxes:

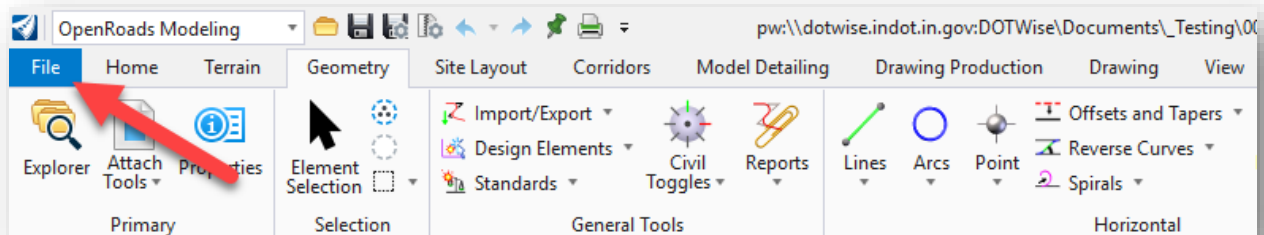
- Key-in window
- View Groups window
- AccuDraw window
- Drawing Scale window
- Snap Mode button bar

2.1-4j Dialogs that are Docked by Default

When you start MicroStation for the first time and open a file, certain dockable dialogs are already docked. This is because the product delivers a docking preference file that defines which dialogs are docked by default, and where they are located. As you make changes to the location of docked dialogs, that information is saved in your personal docking preference file, rather than in the delivered default docking preference file.

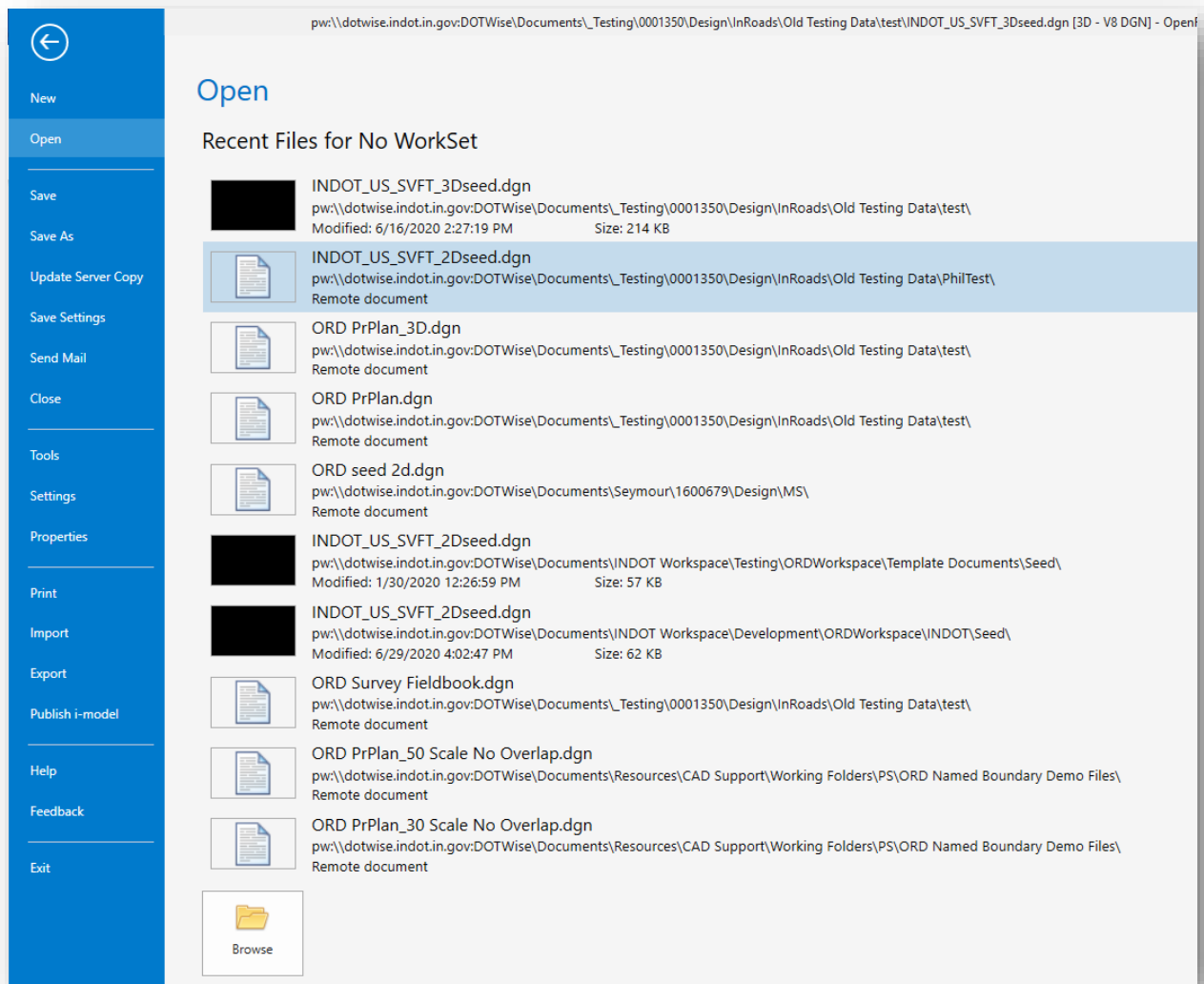
2.1-5 The Backstage View (File Menu)

The CONNECT edition of MicroStation platform products contains a “Backstage View” when the File tab is clicked.



File Tab

This opens the Backstage View (essentially, the File Menu). The basic functionality within the Backstage View is like what was contained within the File menu on previous versions. Specifically note the options on the left side of the view.

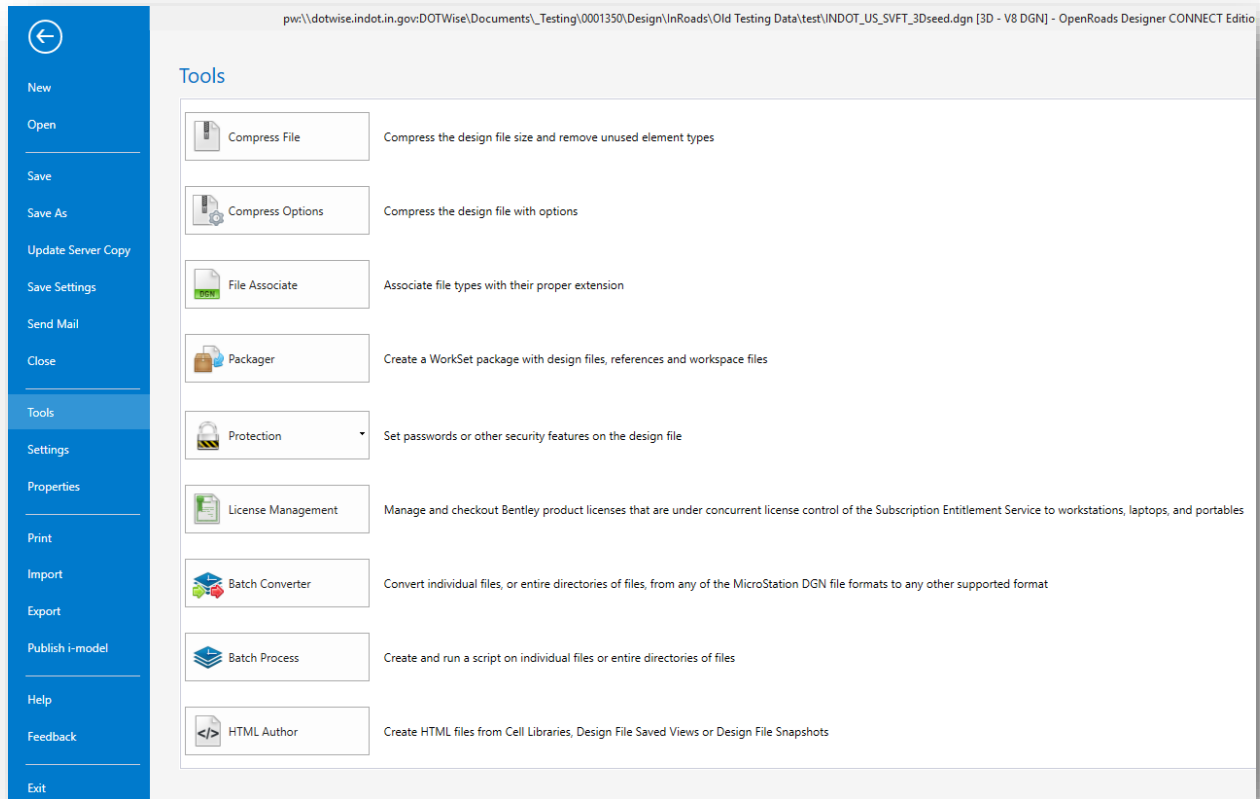


Backstage View

The remainder of this section will give a brief synopsis of the functionality contained within the Backstage View.

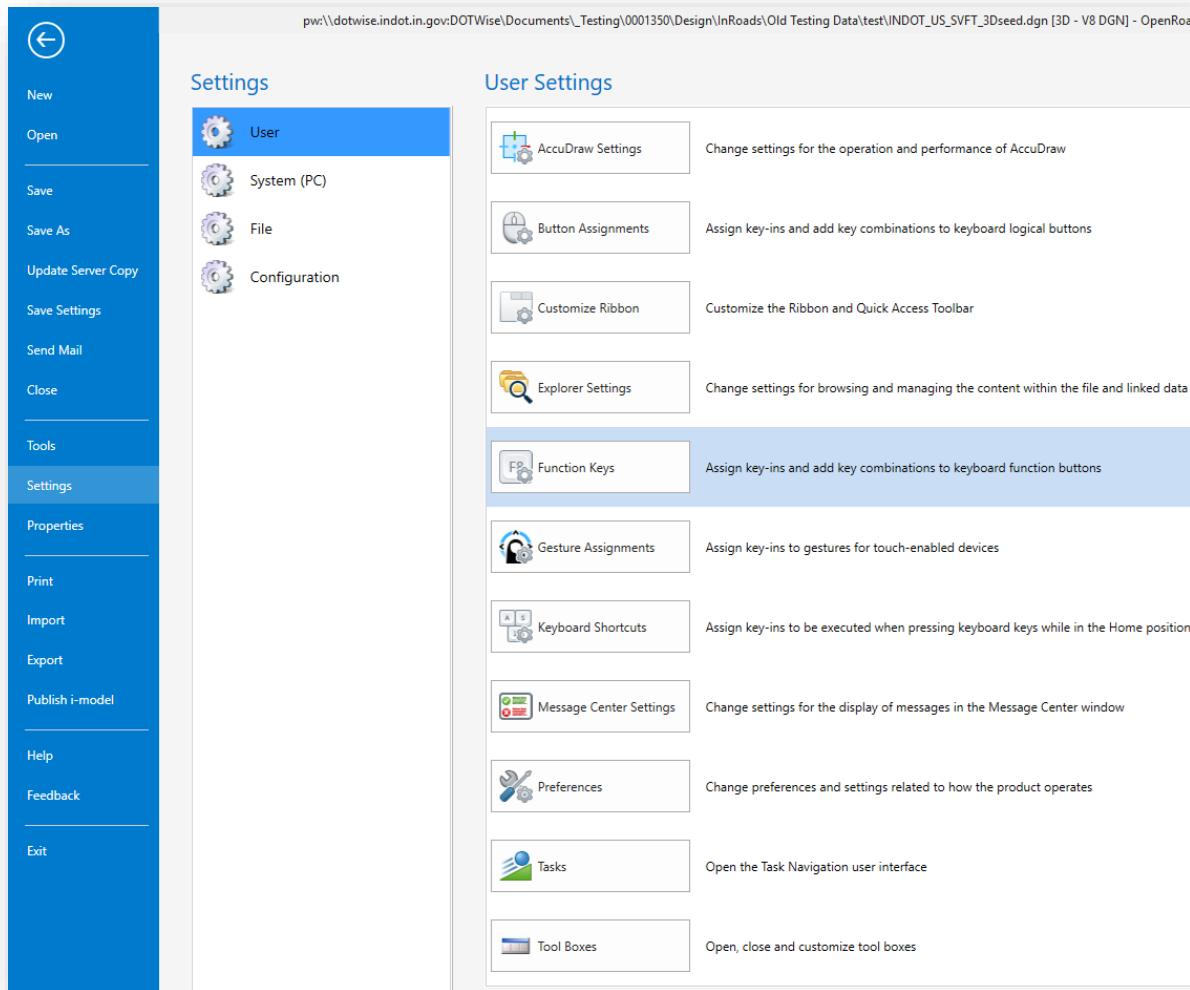
- **New:** Creates a new file either within ProjectWise or on your local PC.
- **Open:** Opens an existing file. A Browse button is provided at the bottom of the Open dialog to aid in browsing to the file you wish to open.
- **Save:** Saves the file.
- **Save As:** Saves the existing file to a different name and/or location.
- **Update Server Copy:** Updates the copy of the file on the ProjectWise server.
- **Save Settings:** Saves the active view settings in the file for when you open it again in the future.
- **Send Mail:** Opens Outlook with a new e-mail that has the current file attached, so that it can be sent via e-mail.
- **Close:** Closes the file.

- **Tools:** Provides some advanced tools to manipulate files. Of note are the Compress File and Compress Options tools to compress the current file's size, and the Batch Process tool to create and run a script to run processes on a group of files.



Tools Dialog

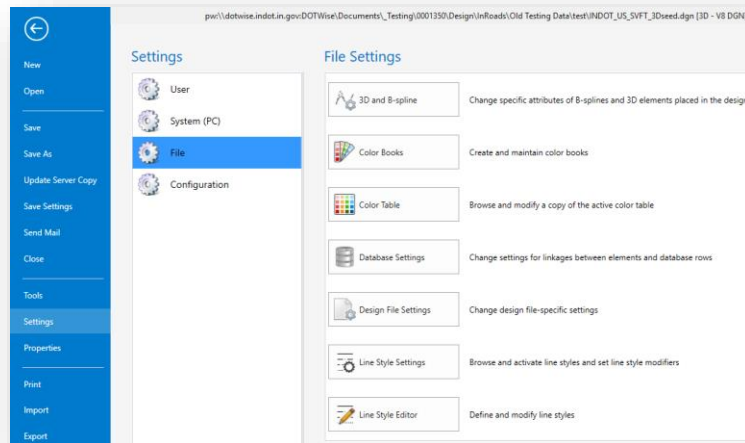
- Settings: Allows you to adjust MicroStation platform settings at the user level, the system (PC) level, and the file level. You can also set up configuration variables if desired.
 - User: These are settings that can be configured on an individual user level and would apply each time the user accesses a MicroStation platform-associated file within the managed workspace.



Settings > User Dialog

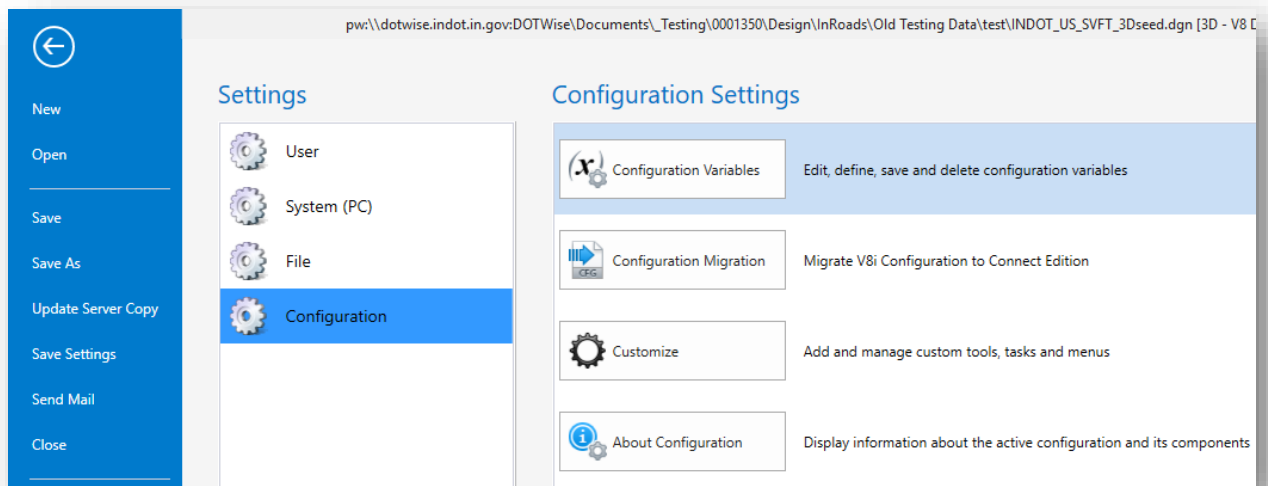
- System (PC): This only contains one setting (Digitizing), which is not applicable for use in our managed workspace.

- File: These are settings that are configured and only applicable to the current design file.



Settings > File Dialog

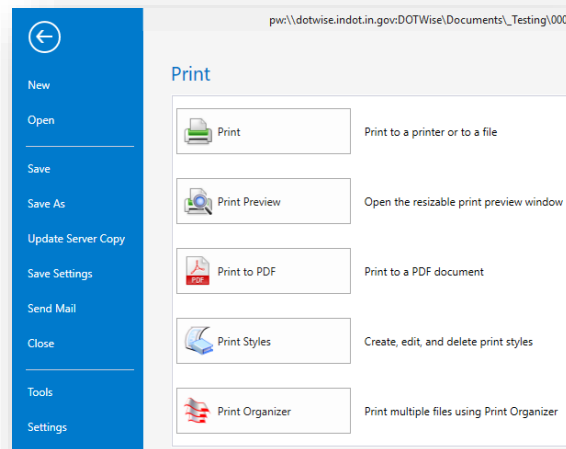
- Configuration: Allows you to adjust various configuration settings within the MicroStation platform. Of note is the Configuration Variables option, which allows you to set up configuration variables.



Settings > Configuration Dialog

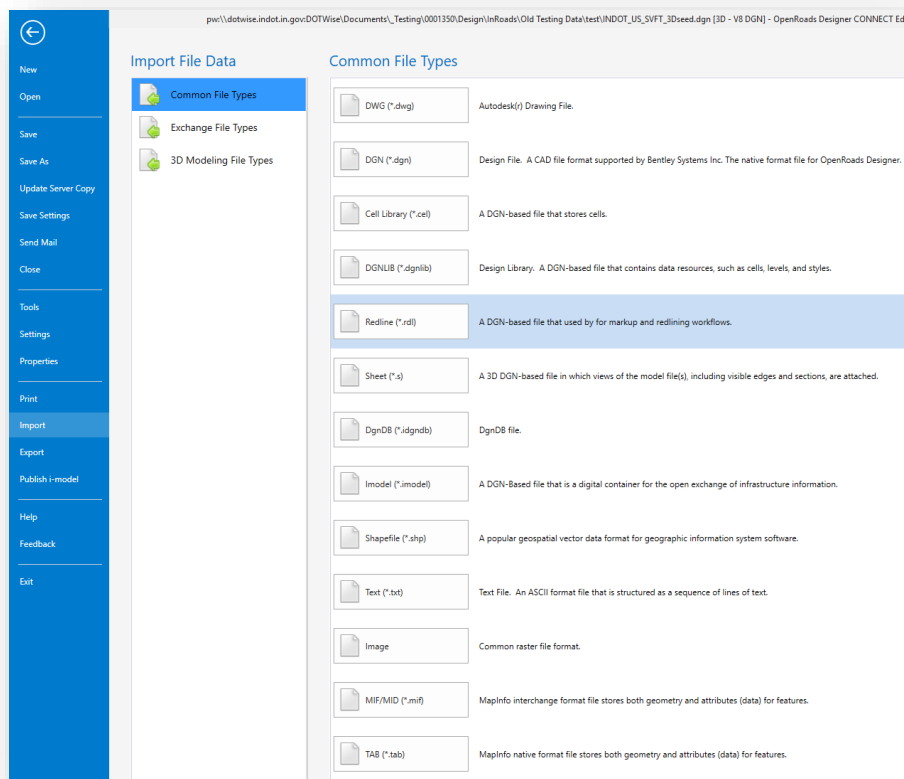
- Properties: Takes you out of the Backstage View (back into the design file) and opens the Properties dialog to display the properties of the file.

- **Print:** Provides you with various options and settings relating to printing files. Of note is the Print Organizer functionality, which is discussed in detail in Chapter 4.



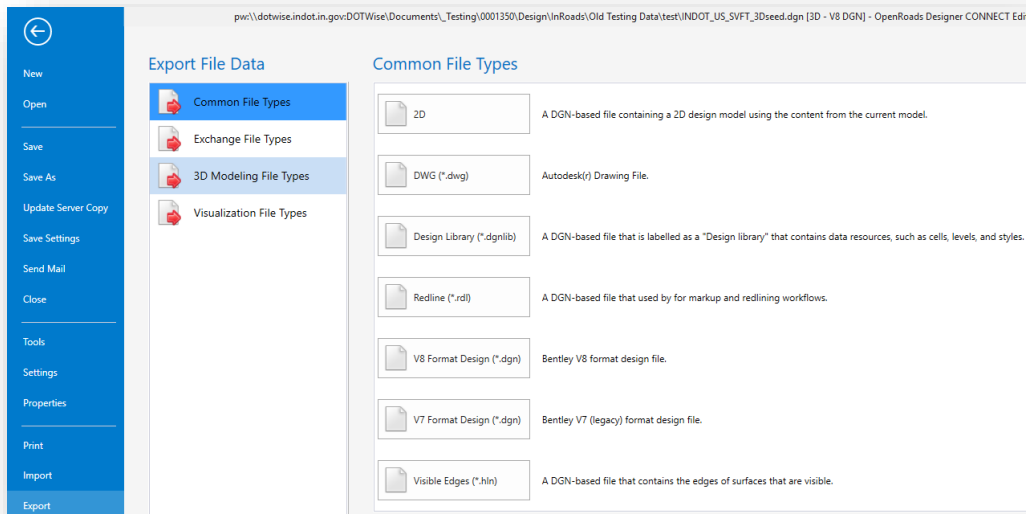
Print Dialog

- **Import:** Provides you with several options to import file data via various file types.



Import Dialog

- **Export:** Provides you with several options to export your file data to various file types.

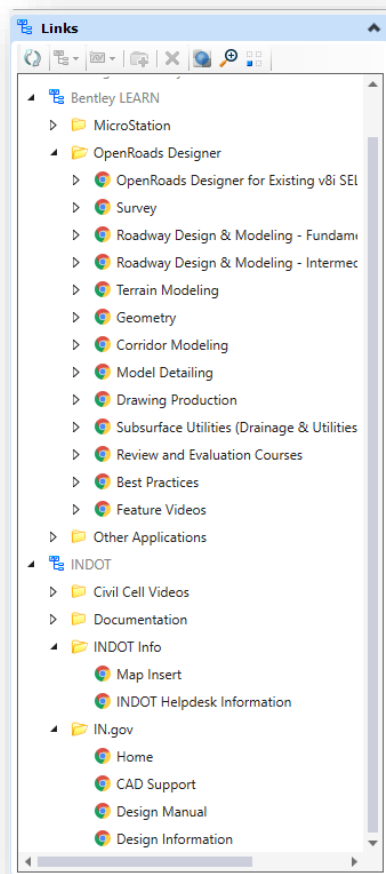


Export Dialog

- **Publish i-model:** Allows you to convert a design file into an I.DGN file and package a set of such files. This i-model functionality is currently not applicable to our workspace but may be implemented in the future.
- **Help:** Provides various help resources to guide you with using the platform application.
- **Feedback:** Allows you to provide either positive or negative feedback to Bentley pertaining to the currently active product.
- **Exit:** Exits the application.

2.1-6 Project Explorer – Links

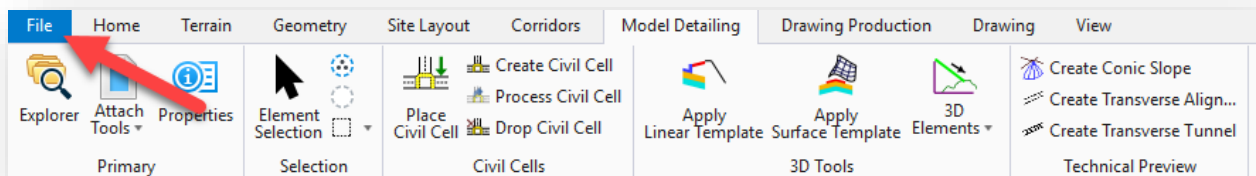
The Links tab provides you with several external links to web sites to assist you with working with the MicroStation Platform and other INDOT-CAD Resources for OpenRoads Designer. Of note are the links listed under Bentley LEARN and INDOT.



Links Tab

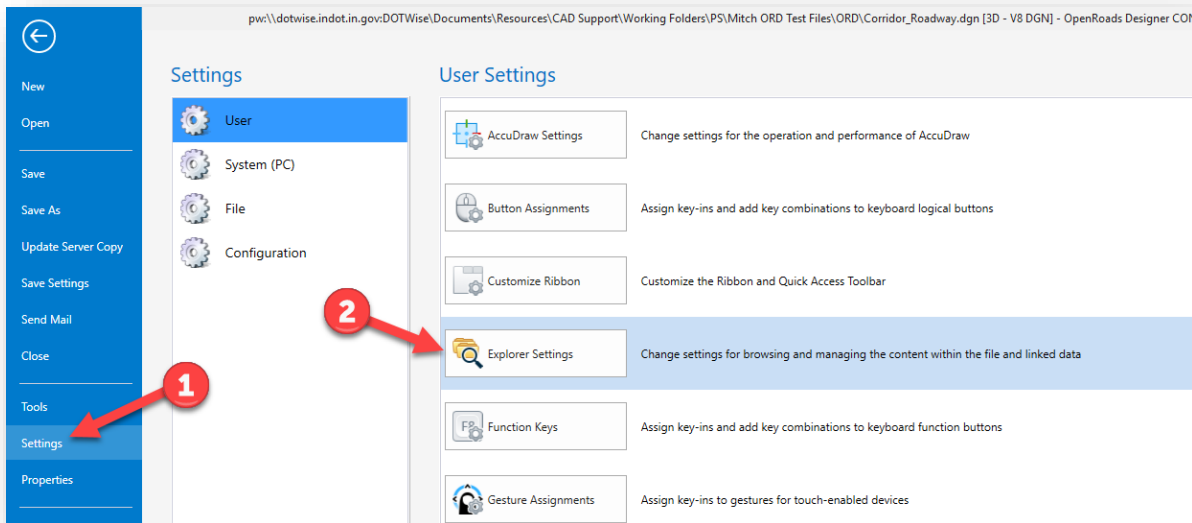
NOTE: The Links tab is not enabled for display by default. To have it displayed, you will need to go into the File menu (Backstage View) per the following instructions:

1. With a file open in the MicroStation Platform, click on the File tab to access the Backstage View.



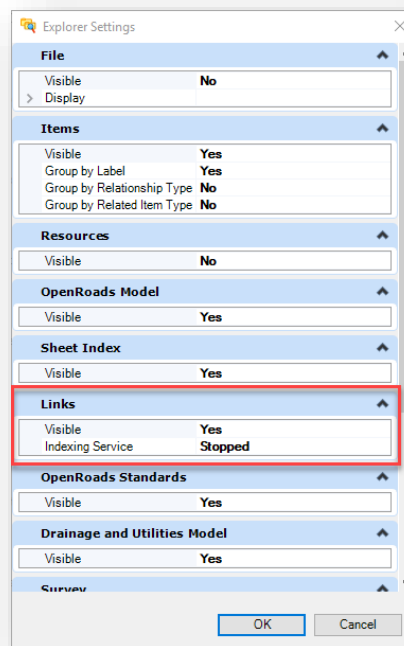
File Tab

2. In the Backstage View, click on Settings > Explorer Settings.



Explorer Settings

3. In the Explorer Settings dialog, locate the Links section and change the Visible setting to Yes. Click OK when done. The Links tab will now be displayed in Project Explorer.



Visible Setting for Links Tab

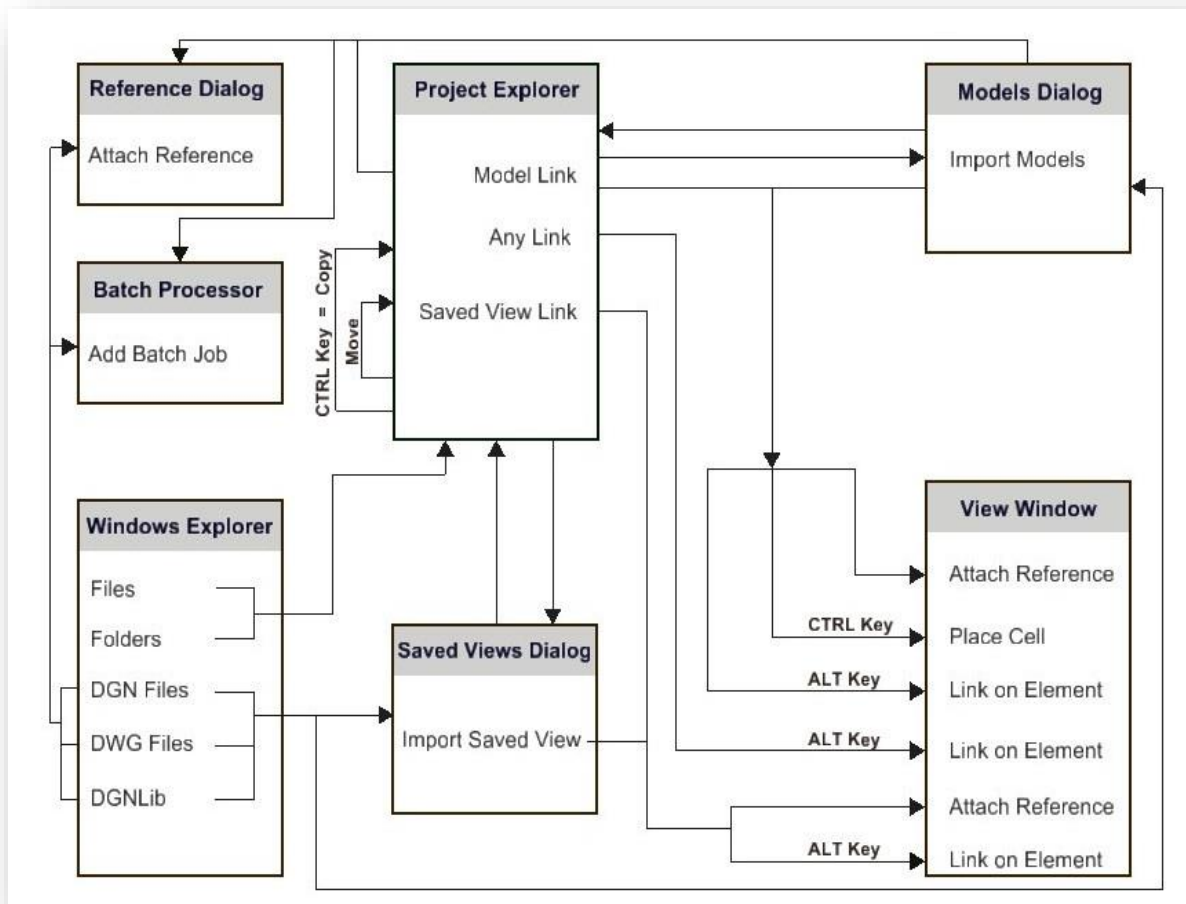
2.2 User Interface Enhancements

The addition of drag-and-drop support, the ability to customize right-click menus and the Tasks dialog, and three new ways to customize the status bar make the interface easier to use.

2.2-1 Drag-and-drop Support

All current MicroStation Platforms contain the ability to drag and drop across several different application areas. The following covers these areas.

Note: Not all functionalities will be available when working within ProjectWise.



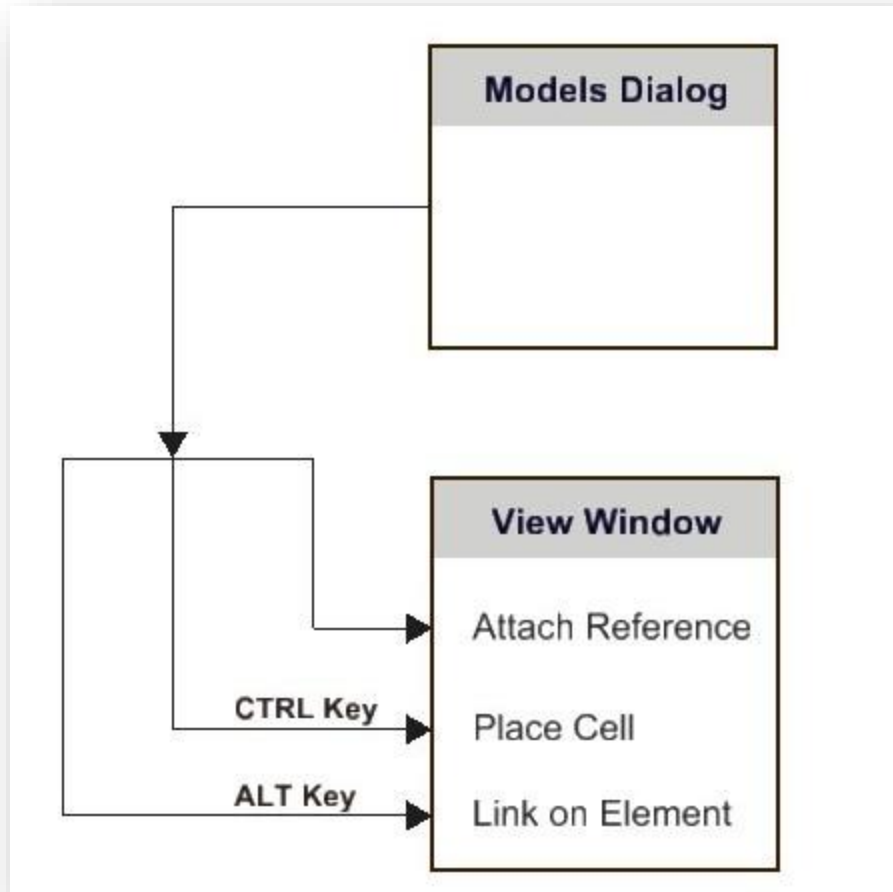
MicroStation Native Drag and Drop Operations

Some of the possible drag and drop operations are:

- Drag and drop models from the Models dialog to the Project Explorer dialog
- Drag and drop a saved view from the Saved Views dialog to the Project Explorer dialog
- Drag and drop files and folders from Windows Explorer to the Project Explorer dialog
- Drag and drop links from the Project Explorer dialog to a view window
- Drag and drop links within the Project Explorer dialog

- Drag and drop saved views from the Saved Views dialog to a view window
- Drag and drop models from the Models dialog to a view window
- Drag and drop DGN, DWG, and DGNLIB files from Windows Explorer to the Saved Views dialog

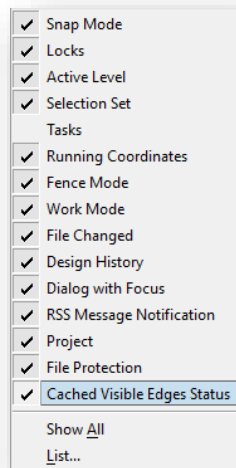
One common use of the drag and drop feature is between the Models dialog and a view window.



Drag and Drop Functions with Command Modifiers

2.2-2 Show/Hide Support in Status Bar

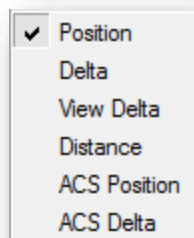
Right-clicking in the status bar opens a menu allowing you to show or hide sections of the status bar.



Status Bar Options

2.2-3 Coordinates Display in Status Bar

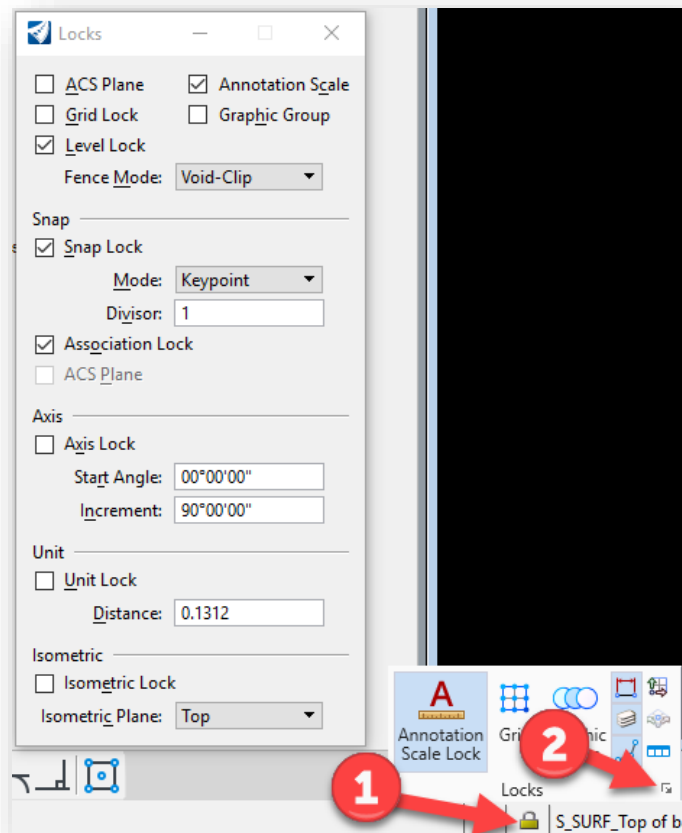
Left clicking in the Running Coordinates section of the status bar turns on the coordinates display. As you move your cursor, the coordinates of your current position display according to the active Tentative Point Mode. When you left click, a menu displays six options. The Delta modes show the X, Y, and Z displacement from the last data point. The Distance modes show the distance and direction from the last data point.



Coordinate Formats

2.2-4 Locks Dialog

Left-clicking the Locks icon on the Status Bar and then clicking on the expand arrow on the bottom right corner of the popup menu opens the Locks dialog.



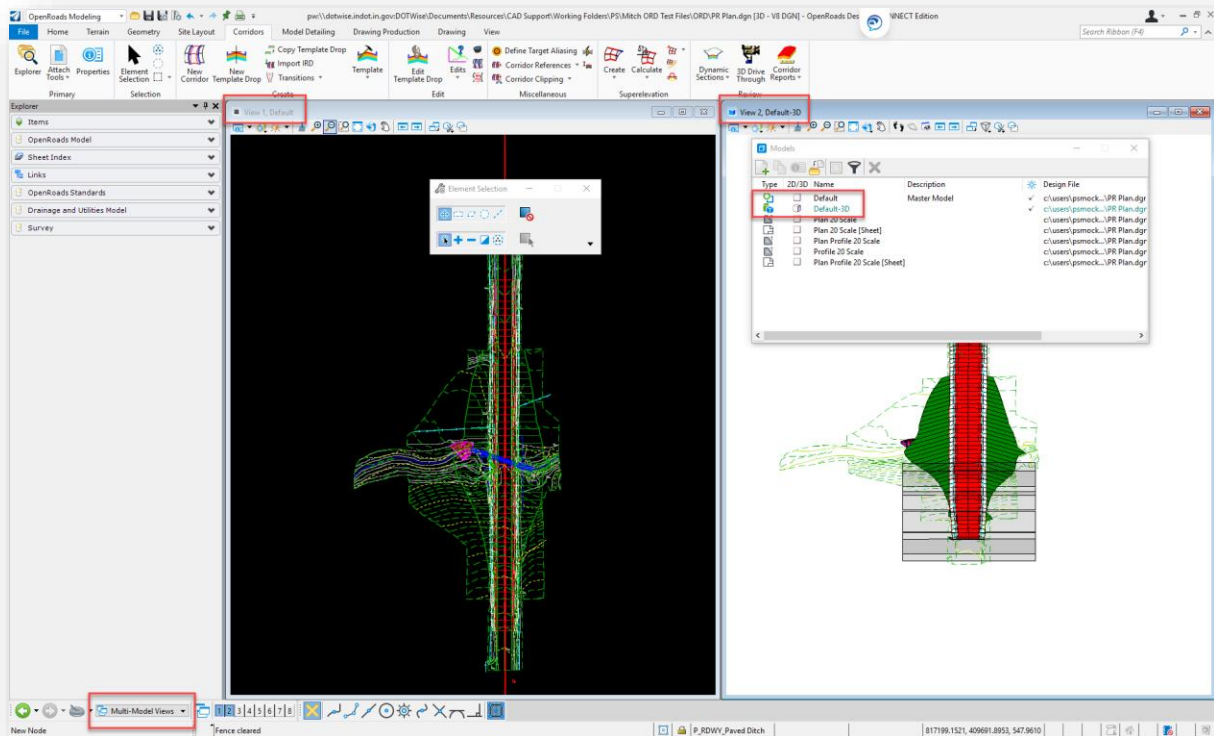
Locks Dialog and Menu

2.3 Models Enhancements

The enhancements to Models include additional viewing capabilities, Project Explorer integration with the Models dialog, and sheet name display in the Models dialog.

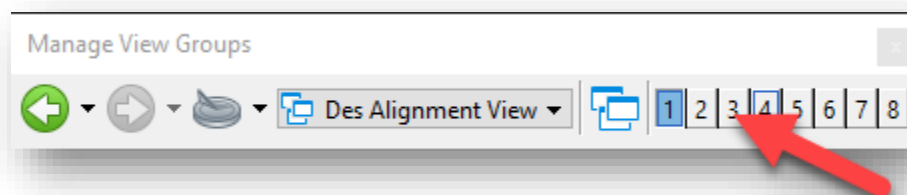
2.3-1 View Different Models from the Same File in Each View

You can view more than one model from the same file in separate views. In the example below, notice that the “Multi-models View” view was created and the titles of the two views match two separate models in the Models dialog.



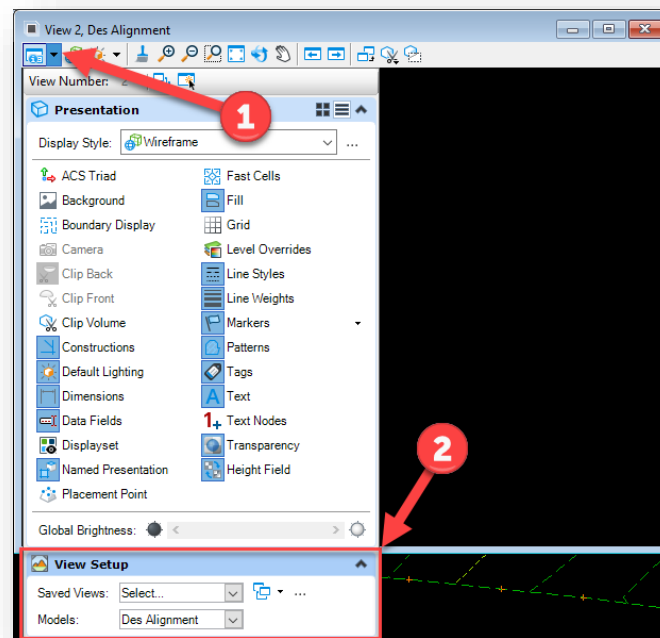
Multiple Model Display

To view different models in each view, first start by opening an additional view from the Manage View Groups toolbar. For this example, open view 2. Alternatively, you can also open it from the View ribbon in most workflows.



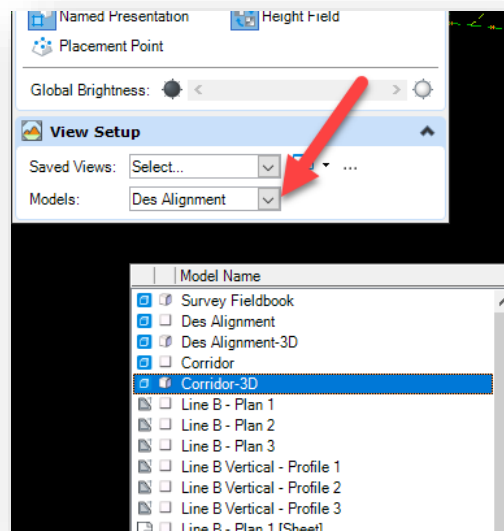
Manage View Groups

In view 2, select the View Attributes in the upper left corner of the window. Locate the View Setup controls in the bottom portion of the dialog:



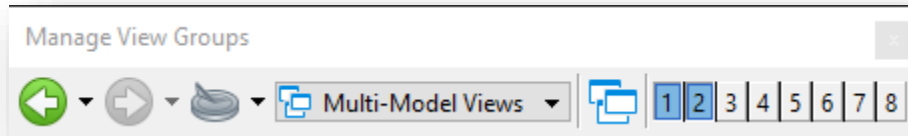
View Attributes and View Setup

In the View Setup portion of the dialog, you may select either an existing saved view, or one of the available models in the file. Doing so will make it display in the view separate from the primary view that was displayed.



Selecting a Saved View or Model

With multiple models displayed in this fashion, the Manage View Groups dialog will now display Multi-Model Views as the active view. Note that this can be saved, and alternative views can be configured for use.



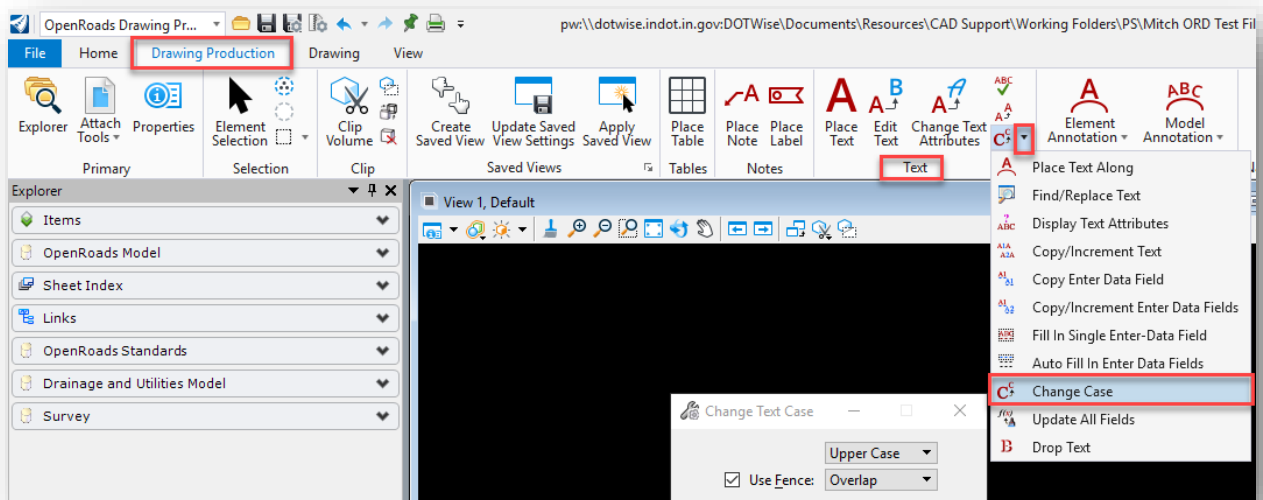
Note: For the OpenRoads Designer environment, there is a provided series of commands in the View Control context menu that will be discussed in that module. In this environment, it facilitates similar functionality with additional enhancements for the civil environment.

2.4 Text Enhancements

Text enhancements include the ability to change case by a selection set or fence. The Advanced tab allows for comparisons between styles. Word Processor updates include an insert field, subscript and superscript icons and right-click operation to change the case. The Edit Text tool retains its text settings, and the Find/Replace Text tool supports data fields.

2.4-1 Change Case by Selection Set or Fence

This tool is used to change the case of a piece of text. Case change options include Upper Case, Lower Case, Title Case, and First Capital. This tool also supports text selection via a fence. This tool can be found in most workflows on the Text Group in the Drawing Production tab. Click on the dropdown arrow in the Group, and then select the Change Case tool.



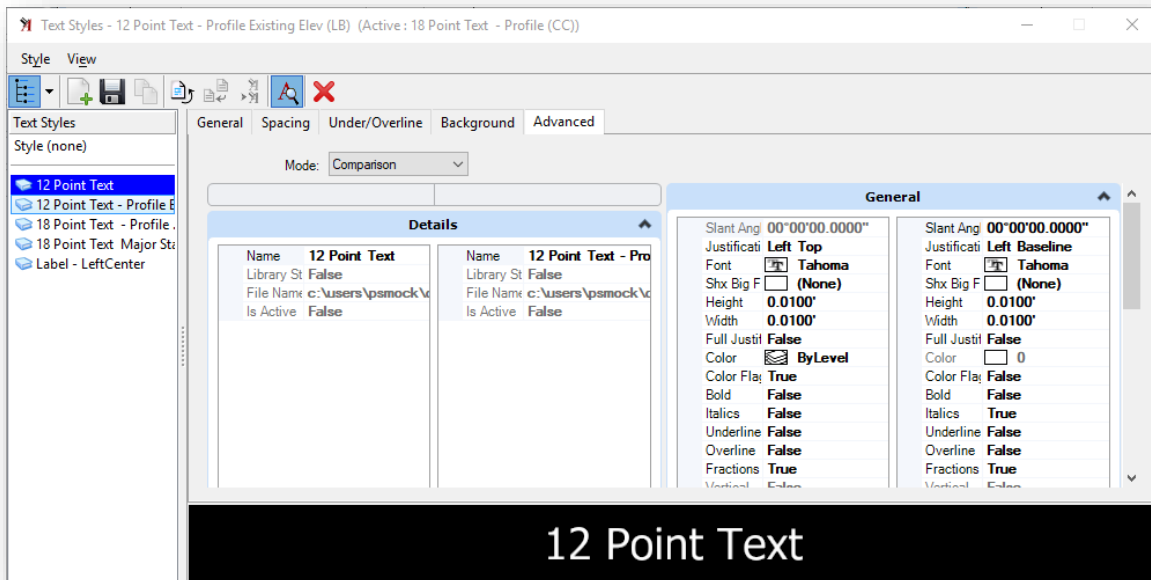
Change Text Case

2.4-2 Text Style dialog enhancements

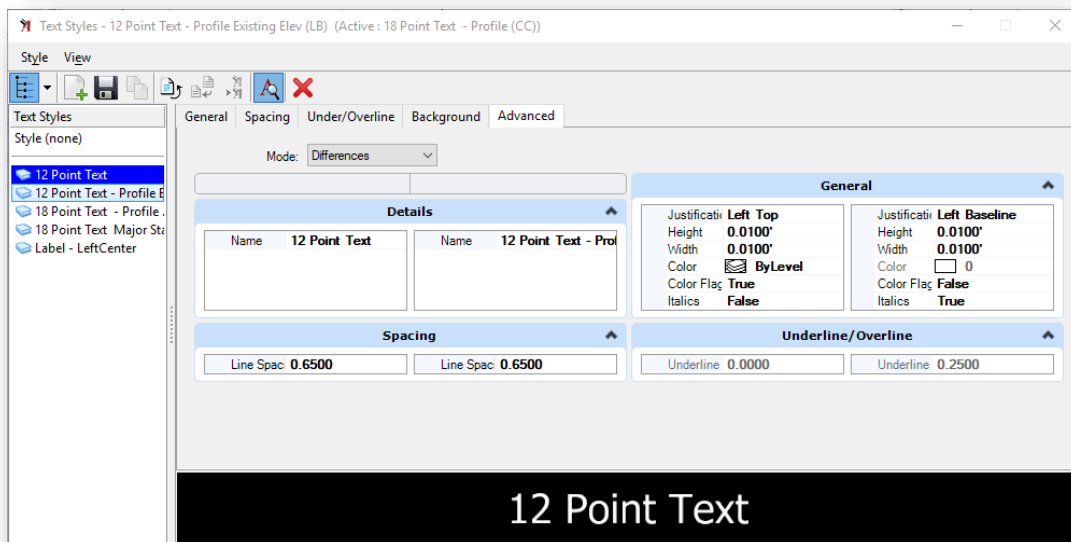
For information on INDOT Specific fonts, please see Appendix B.

2.4-2a Advanced Tab in Text Styles Dialog Allows Comparison Between Styles

Two new modes (Comparison and Differences) have been added to the Advanced tab of the Text Styles dialog. Comparison mode shows a side-by-side comparison of the properties of two selected text styles. Differences mode shows the differences of the properties of two selected text styles.



Text Style Comparison



Text Style Differences

2.4-3 Text Editor Enhancements

Three new icons have been added to the Text Editor dialog.

The Insert Field icon opens the new Field Type Picker dialog, used to select the type of field to be created. See Placeholder fields for more information.



Text Functions

The Superscript icon allows you to create text with superscript by typing in the text, clicking the superscript icon, then typing in the number. The Apply Changes to all Text check box must be toggled off to place superscript.



Superscript Text

The Subscript icon allows you to create text with subscript by typing in the text, clicking the subscript icon, then typing in the number. The Apply Changes to all Text check box must be toggled off to place subscript.



Subscript Text

2.4-3a Right-click to Change Case

The Change Case menu items (All Upper, All Lower, Title, and First Capital) have been added to the right-click menu of the Text Editor dialog.

2.4-4 Using Fonts

MicroStation supports three types of fonts: True Type, RSC (MicroStation Resource Font) and SHX (AutoCAD Fonts).

2.4-4a True Type Fonts

Many TrueType fonts are delivered with Windows, and many more are available from various vendors for free or for purchase. *TrueType is an industry standard format supported by MicroStation.* In general, this is the recommended font type for use in MicroStation. TrueType fonts also include full Unicode support (note: not all TrueType fonts contain characters for all languages). TrueType fonts are always filled, and therefore do not provide good support for “stick” fonts (as opposed to SHX and RSC fonts).

2.4-4b RSC (MicroStation Resource Font)

This font format is MicroStation-specific, and RSC fonts are stored in MicroStation resource (.rsc) files. A single resource file may contain several RSC fonts. RSC fonts have a number and a name, but only one font by a given number can be used at a time during a MicroStation session. If multiple RSC fonts share the same number, the last one to be loaded is the font assigned to that number in each session. RSC fonts are locale-encoded, but support more than 255 characters (e.g., for some Asian languages). The code page of RSC fonts is specified in the font configuration file. If you use font characters for symbols, use RSC fonts rather than TrueType fonts.

Due to various compatibility issues, and lack of customization tools, RSC fonts other than those provided with SignCAD, or the MicroStation Platform are no longer available for use in the INDOT Workspace.

2.4-4c SHX (AutoCAD Fonts)

MicroStation supports AutoCAD's font format (including normal SHX fonts, SHX Unifonts, and SHX Bigfonts). You should use SHX fonts only when you must ensure AutoCAD compatibility, and TrueType fonts are not a viable option. SHX Unifonts are the current standard and allow a single font (and font file) to contain characters in the entire Unicode range. Older SHX fonts only support up to 255 characters, and thus require a paired SHX Bigfont to support languages with more than 255 characters (e.g., Asian languages). In MicroStation, specifying a paired SHX Bigfont is optional, and is recommended if you require characters that cannot be provided by the base SHX font.

If AutoCAD is installed, MicroStation searches for SHX fonts in AutoCAD's Fonts directory (the "Fonts" folder in the installation directory of the most recently used version of AutoCAD). With or without AutoCAD, MicroStation searches the directories specified by MS_FONTPATH, as well as the same directory as the design file requesting the font.

DWG Export: AutoCAD natively supports SHX fonts, and no special export is performed.

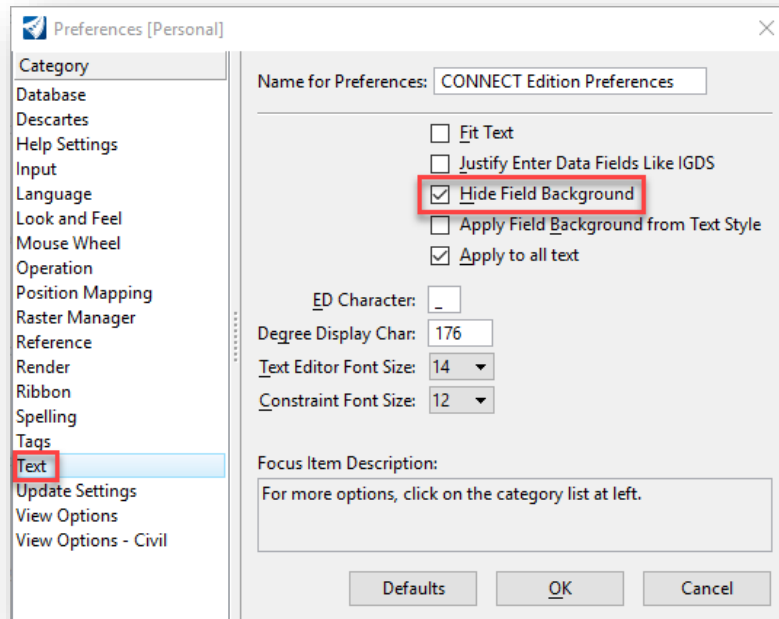
2.4-5 Edit Text Tool Retains Text Settings

In the past, the Edit Text tool would change the active settings whenever you edited a piece of text. This behavior has been changed so settings revert to the previous settings when the Edit Text tool is closed. This change affects the active settings only and not the text styles.

2.4-6 Disabling Text Field Backgrounds

Various text tools may take advantage of MicroStation fields, tying Model or other properties to a piece of text. Depending on the workflow, it may be desirable to disable the background of the text field for use in other applications.

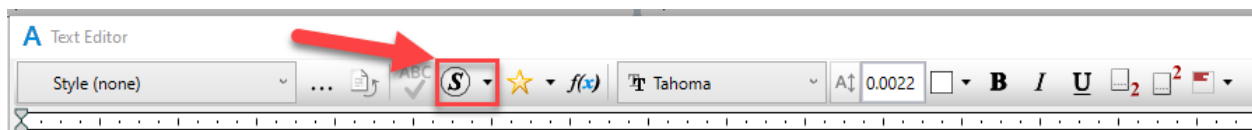
To disable the field background, click on the File tab in the MicroStation platform to access the Backstage View. Then click on Settings > Preferences to access the Preferences dialog and navigate to the Text option on the left. Enable the third option, Hide Field Background.



Disabling Field Backgrounds

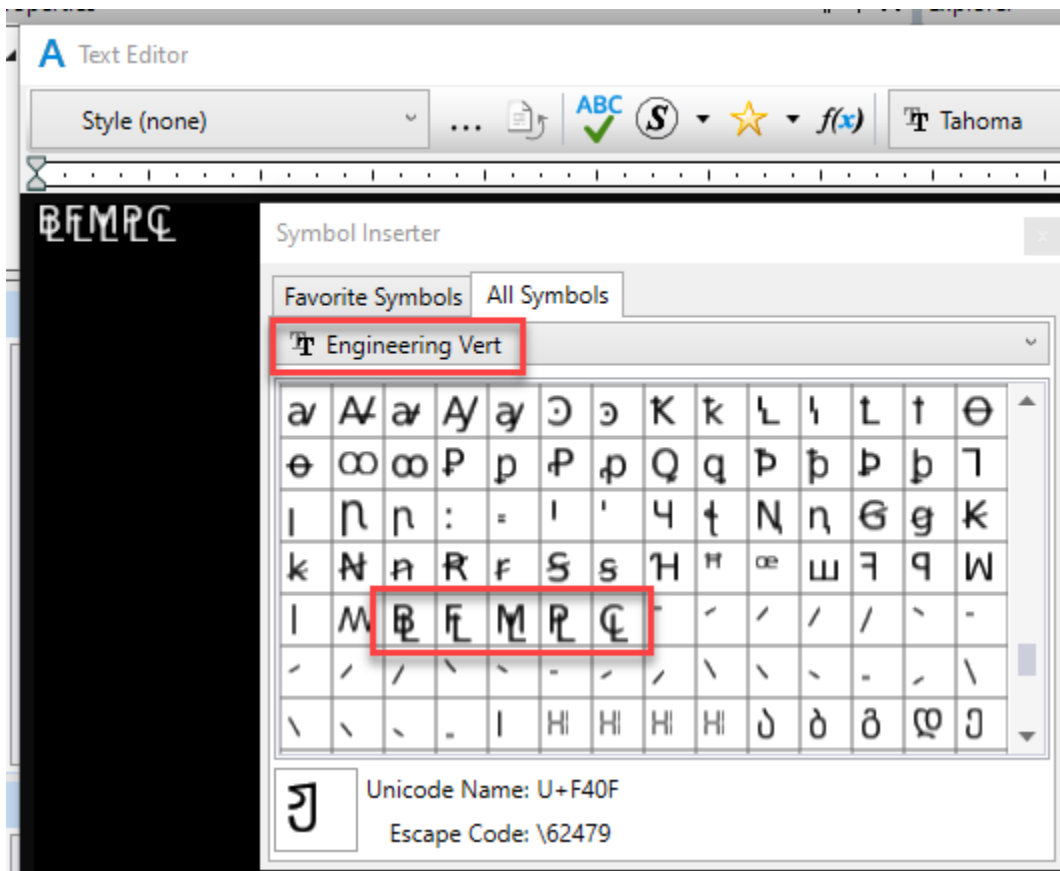
2.4-7 Special Character Symbols

The MicroStation Platform has included a true type font style—Engineering Vert—that includes the various special character symbols you use to insert in your drawings. The advantage of this is that you no longer need to search through a cell library to find the proper cell that contains the symbol you need—it can just be placed directly via the Text Editor. Simply open the Text Editor and click on the Insert Symbol button.



Insert Symbol Button

Then on the Symbol Inserter dialog that appears, go to the All Symbols tab and select the Engineering Vert font. With the symbols for the font listed, scroll most of the way down the list and you will find the various symbols you might need (flowline, property line, centerline, etc.).



Engineering Vert Special Character Symbols

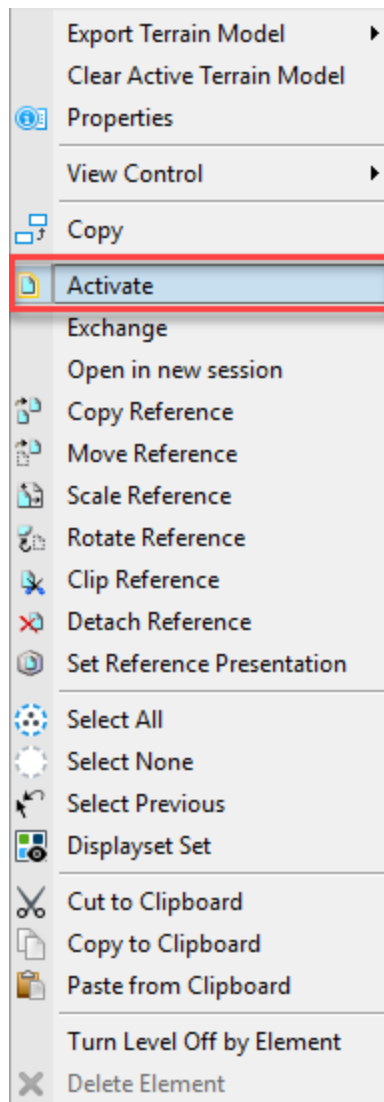
Note that the preceding process can be used for a variety of symbols and across several fonts. Not all fonts will contain the same symbols, nor will they necessarily be in the same locations.

2.5 References Enhancements

A major enhancement to references is the ability to edit a reference from within the active model. In addition, the active model's annotation scale applies to annotations in references.

2.5-1 Activate Reference for In-Place Editing

The MicroStation Platform lets you edit a reference in-place. That is, you can edit a reference from within the active model. To do this you first must activate the reference.



Reference Activation

When a reference is activated:

- Only operations on the activated reference are permitted.
- By default, all elements in references above the activated reference in the file hierarchy, as well as the active model, are displayed with an override color. You can control whether an override color is used, and what the color is.
- If you activate another reference, the currently activated reference is automatically deactivated.
- The reference is locked so that it cannot be edited in another session.
- DGN library data, such as levels and level filters, is not available in an activated reference file.
- Activated referenced in InRoads allows for the interaction with underlying civil data such as terrains and alignments.

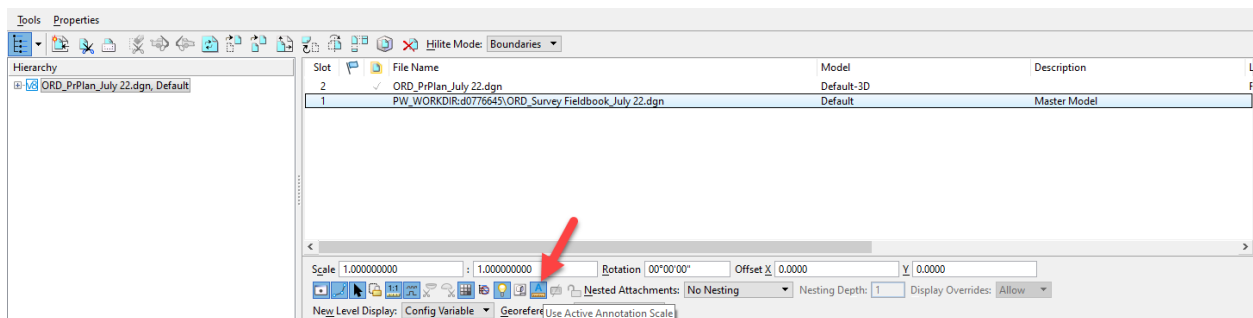
Note: Activating references should only be used with core MicroStation Platform content. Elements with additional information such as civil content from OpenRoads Designer, or vehicle paths from AutoTurn should not be modified via an Activate reference. Doing so can cause the extended information these elements contain to be corrupted or removed resulting in application crashes or lost data.

2.5-2 References Support Active Model Annotation Scale

In the past, you may have added annotations to design models that are referenced into sheets. You also may have added annotations directly on the sheet. If the annotations were too small, you would have changed the model's annotation scale, but that would have affected only the annotations directly on the sheet. The annotations in the reference were not changed. Therefore, the only way you could change the annotations was to exchange into the reference and scale them.

Now the active model's annotation scale applies to annotations in references, too. If you change the scale of the annotations on the sheet, the scale of the annotations in the references changes as well.

To make a reference's annotations use the active model's annotation scale, you must turn on this option. In the References dialog, there is a button along the bottom named Use Active Annotation Scale. Use this button to toggle this setting on and off as desired.



Use Active Annotation Scale

2.5-3 Detail Scale

Detail scale helps you represent the Master:Ref scale in terms of the sheet scale. For example, if your sheet scale (annotation scale) is $1/8" = 1'$ and you want to place a detail reference of scale $1/4" = 1'$, simply pick the new scale from the Detail Scale combo box. It automatically computes the Master:Ref scale as 2:1.

2.5-4 Synchronize with Saved View

When you attach a saved view, you can specify that the display of the reference should always be synchronized with the original saved view. In the Reference Attachment Settings dialog, turn on the Synchronize with Saved View check box.

To change the appearance of a reference, you must modify the saved view that it is synchronized with. This is to ensure fidelity of display properties such as view attributes, level masks, clip volume, display styles and others.

When synchronized, the reference location is also realigned. Specifically, when the reference is synchronized with the saved view, the reference center and saved view center remain aligned. You can see the effect of this in two ways:

In an unsynchronized state, the reference is first shifted and then synchronized.

When synchronized, the saved view center is changed; for example, the saved view is stretched.

2.5-5 Change Attachment Orientation

In this edition you can change the orientation of the reference attachment by clicking the reference's Orientation column in the References dialog.

2.5-6 Reference Detail Scale

When attaching a reference (a design or drawing model) into a sheet model, the referenced model's annotation scale is applied as the detail scale, and the Reference Scale (Master:Ref Scale) is calculated from the referenced model's annotation scale and the active model's annotation scale.

3. Imagery in MicroStation Platform – WMS and Map Insert

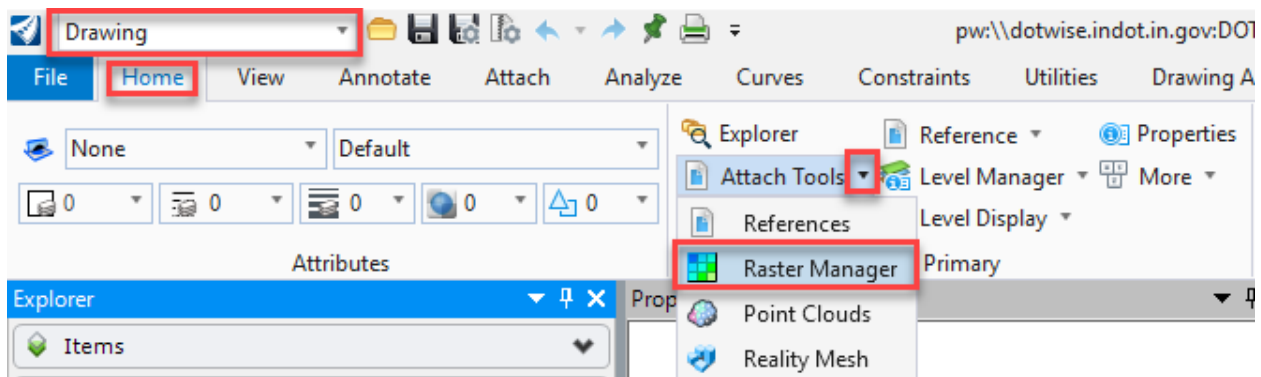
3.1 Introduction to WMS

A Web Map Service (WMS) is a standard protocol which provides georeferenced map images over the Internet that have been created by a map server using data from a GIS database. At INDOT the map data is obtained from the ArcGIS Server. The MicroStation platform can then be used to connect to the WMS. The INDOT WMS server connections have already been established and preset WMS map definitions (XWMS files) have been created for the available images. Currently the available map definitions are NAIP 2008, NAIP 2010, NAIP 2012, NAIP 2014, NAIP 2016, Ortho 2005, Quad 24k, 2011_2013 Statewide Imagery, Best Available (which is a constantly updated map containing the most recent and highest resolution imagery, currently the 2011/2013 images), and Most Recent Available Imagery (which is the most recent imagery available but is not survey grade and will show differences in geocoordinated data situations). These preset map definitions are in ProjectWise at the following location: [Documents\Resources\XWMS](#).

3.1-1 Open Existing Map Definition

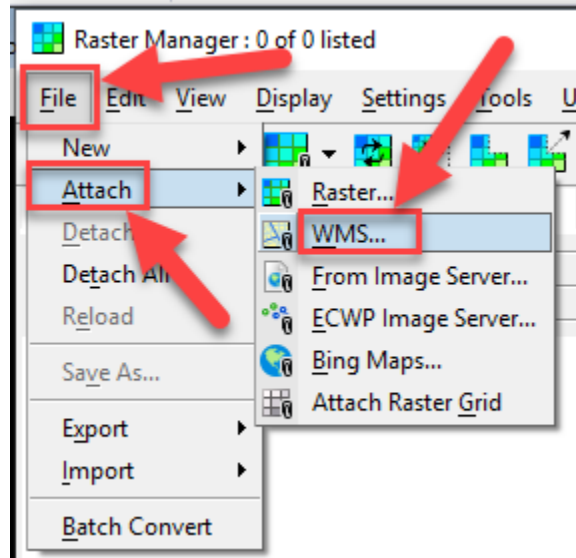
NOTE: When importing any imagery files (including XWMS files, .TIFF, .jpg, .pdf, etc.) into any MicroStation-based application, please note that you should only do so in 2D models. DO NOT import them into 3D models—as this will cause significant issues if any plan sheets containing imagery files would need to be plotted.

1. Open a MicroStation based session from within ProjectWise. From the Drawing workflow, locate the Primary Group on the Home tab, click on the dropdown next to “Attach Tools”, and then select Raster Manager:



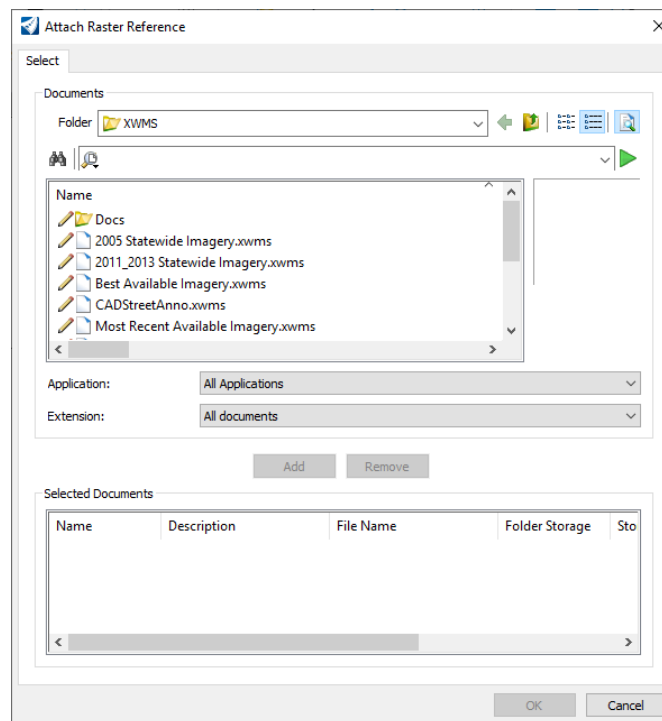
Raster Manager

2. On the *Raster Manager* window select *File -> Attach -> WMS*.



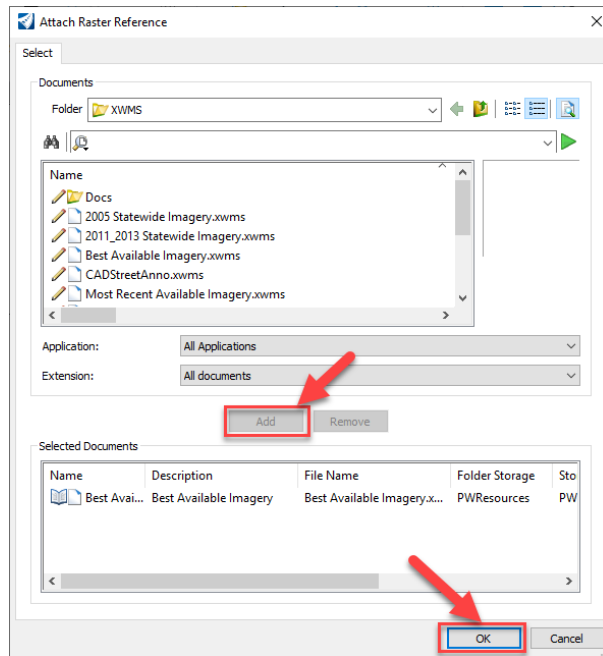
Attach WMS

3. ProjectWise's *Attach Raster Reference* window appears. In ProjectWise navigate to pw:\\indot-pw.bentley.com:indot-pw-01\Documents\Resources\XWMS. Within this folder, select the XWMS resource file you need to attach.



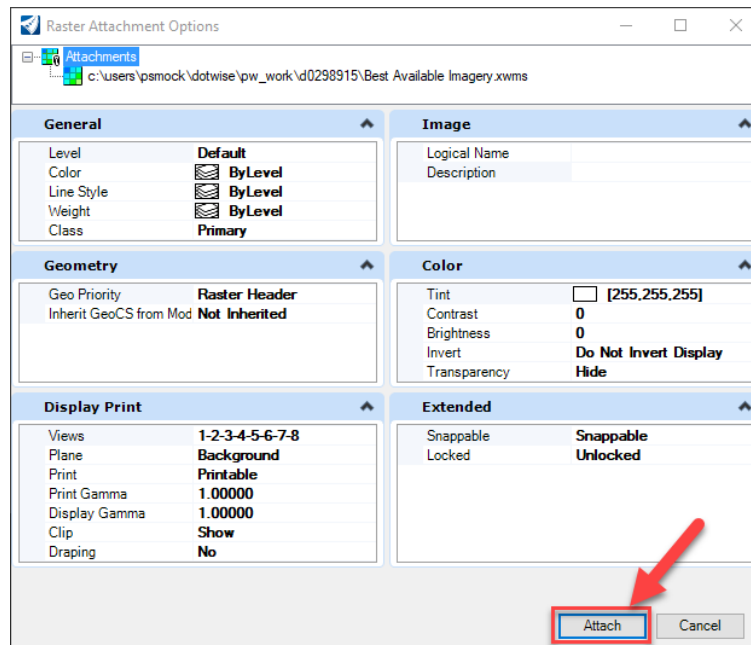
Attach Raster Reference Window

4. Once the XWMS file has been selected, select *Add -> OK*.



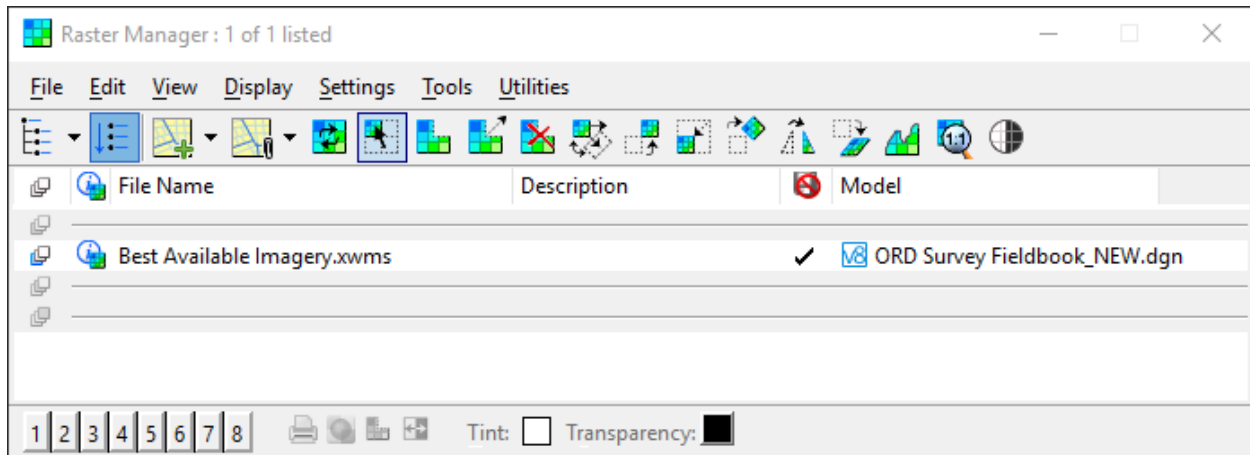
Select an XWMS File

5. In the *Raster Attachment Options* window adjust options as desired, and then select *Attach* at the bottom of the window.



Raster Attachment Options

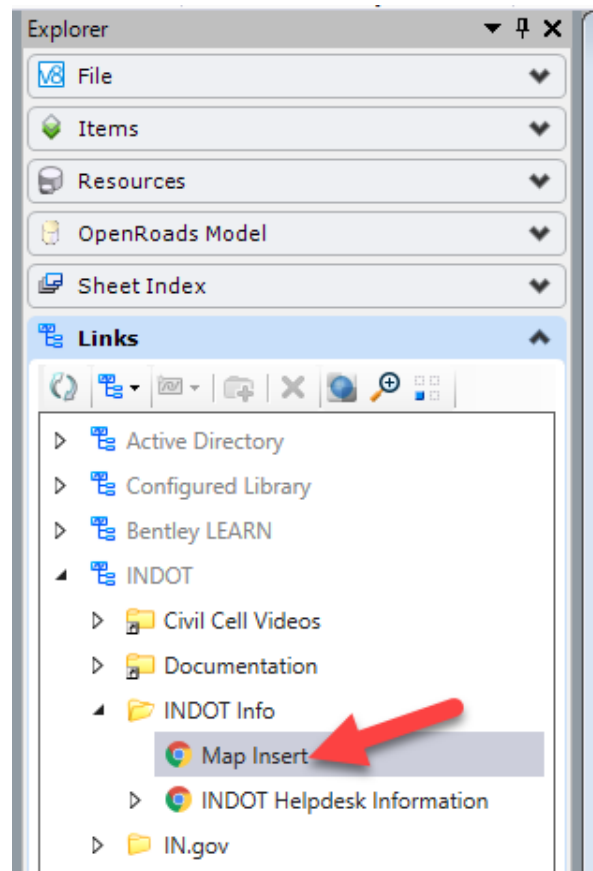
6. The image is now attached to the DGN as shown in the *Raster Manager* window.



Attached Raster Image

3.2 Map Insert Application

1. Locate the Map Insert link in the Explorer window of the MicroStation platform. This can be found in the Links tab of the Explorer window, under INDOT > INDOT Info.



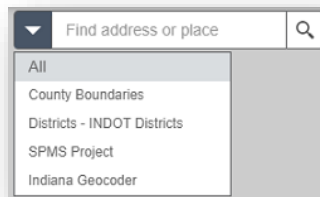
Map Insert Link

2. Click on the Map Insert link or copy the following URL to the web browser navigation ([INDOT Map Insert \(arcgis.com\)](https://indotmapinsert.arcgis.com)). *NOTE: The Map Insert Tool prefers Chrome, Edge, or Firefox.*



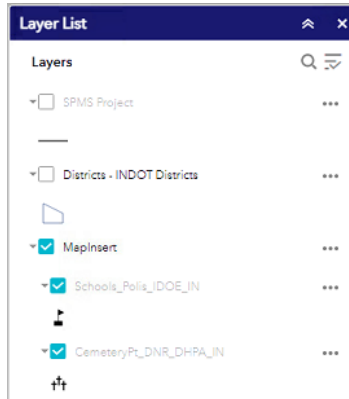
INDOT Map Insert Tool

3. At startup, the entire State of Indiana is displayed. To zoom in to a specific area of the state you can use the mouse wheel. By clicking the left mouse button and holding it down you can pan the view.
4. Searching: To zoom to a desired location, enter one of the following: county name, district name, project des#, or address. You may optionally select the type of search in the drop down.



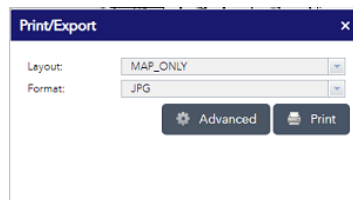
Performing a Search in INDOT Map Insert Tool

5. The layer list toolbox allows you to toggle on/off which layers are displayed in the view. Use the arrows to expand the main folders in the list (Projects and Map Insert), and the checkboxes to toggle the layers on/off. Several of the layers are off by default, which means they will not be visible until you check the box to make them visible.



Layer List

6. Once you have the area of interest displayed and the desired layers turned on, use the Print widget to create the Map Insert image.



Printing from Map Insert Tool

7. Select the applicable Layout and Format for the exported map. You may need to test the sizes to find the desired output.
8. Type a title for the map in the Map title text box. *Note: The MAP_ONLY format prints only the map, omitting any marginal information from the output.*

9. For additional Printing options, click Advanced.

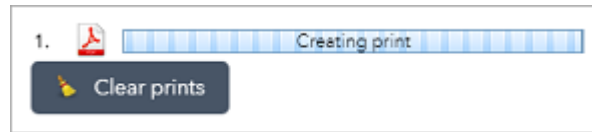
The screenshot shows a dialog box with two tabs at the top: 'Advanced' (selected) and 'Print'. The 'Advanced' tab contains the following settings:

- Map scale/extent:**
 - Preserve:** Two radio buttons, 'map scale' (selected) and 'map extent'.
 - Force scale:** A radio button followed by a text box containing 'current'.
 - Output spatial reference WKID:** A text box containing '102100'.
 - WGS_1984_Web_Mercator_Auxiliary_Sphere** (text below the WKID box).
- Layout metadata:**
 - Scale bar unit:** A dropdown menu showing 'Miles'.
 - MAP_ONLY size:**
 - Width (px):** A text box containing '670'.
 - Height (px):** A text box containing '500'.
 - Print quality:**
 - DPI:** A text box containing '96'.
 - Feature attributes:**
 - Include attributes:** An unchecked checkbox.

- a. The following options are available:
- Map scale/extent**—Defines the method that the print service uses to calculate the printed extent of the map.
 - Preserving **map scale** causes the printed map to maintain its scale while recalculating the extent around the existing center point. Preserving **map extent** causes the scale to adjust to fit the current map extent onto the printed map. You can also force a specific scale by clicking the **Force scale** option and providing a scale. Click **current** to populate the value with the present scale of the map.
 - Output spatial reference WKID**—Defines the output spatial references of the print by specifying a valid well-known ID ([WKID](#)).
 - Layout metadata**—Allows you to override the default values set in the configuration.
 - Specify values for the **Author** and **Copyright** properties to provide current information to the print service. Check the **Include legend** check box to display the legend on the printed map.
 - MAP_ONLY size**—If the Map_Only format is selected, you can provide dimensions for the **Width** and **Height** properties in pixels. Otherwise, these values are ignored.
 - Print quality**—Allows you to update the resolution of the printed map.
 - Provide an updated value for the **DPI** (dots per inch) in the text box.
 - Feature attributes**—If **Include attributes** is checked, the feature's attributes are included in feature collection layers. This is only applicable to custom print services that use the feature attributes, for example, to display a table of features and their attributes.

10. After all options have been set with the applicable values, click Print to submit all information to the print service.

A progress bar displays next to the executing task.



Upon completion of the print job, a link to the print output displays.



11. Click the task to open the file in a new window.
12. In the new window containing the image, right click on the image and save it to your computer.
13. Using the standard Windows drag-and-drop procedure, upload the saved map image to your desired location in ProjectWise.
14. Within the file you want to add the image to, attach the image as a raster.

Note: The date and time format of the printout is based on the location of the printer.

4. MicroStation Platform - Plans Production

This chapter will first cover the standard INDOT naming convention for various types of MicroStation-based drawings. Then what follows is a description of the processes involved with sheets that are manually created from our DGN template document files. Examples will be given for the creation of title and index sheets, and then there will be separate discussions of the specific plans production process for Resurface and Traffic plans. For recommendations on sheet naming, please see section 4.4 which covers a variety of potential sheets that may be included in a project or found in legacy data.

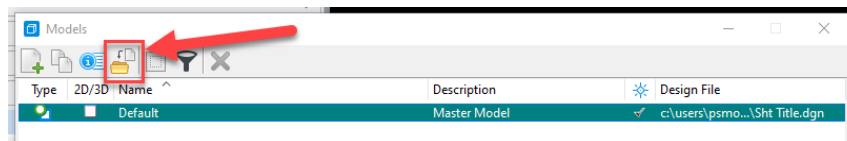
4.1 Creating Sheets from DGN Template Documents

The first step in creating sheets from our DGN template documents is to first make a copy of our [INDOT US SVFT 2Dseed.dgn](#) file into your project. This serves as a template file that you can work from. Then within that file, you can import in the necessary sheet model from one of our template documents—namely [D size sheets.dgn](#) and [Ltr sheets.dgn](#)—depending on the plan sheet size that you're working with. These files can be found within the [DGN](#) folder under [Template Documents](#) in ProjectWise. What follows are the next steps in the process for creating a title sheet and for creating an index sheet. For the following examples, full size sheets for road plans will be used.

4.1-1 Creating a Title Sheet

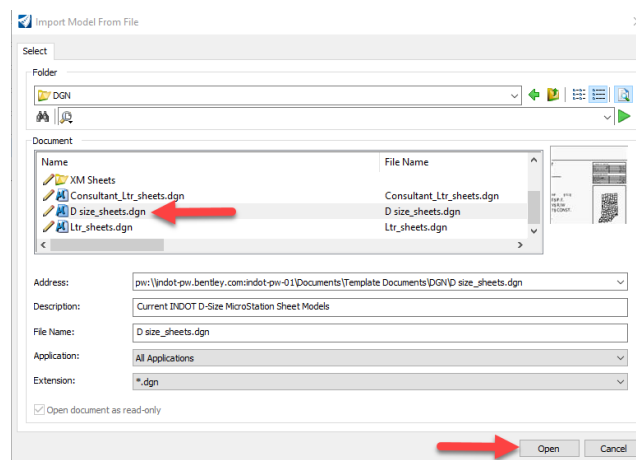
With the seed file copied into your project and named according to standard title sheet convention, perform the following steps:

1. With the title sheet file open, open the Models dialog and click on the [Import Models](#) button.



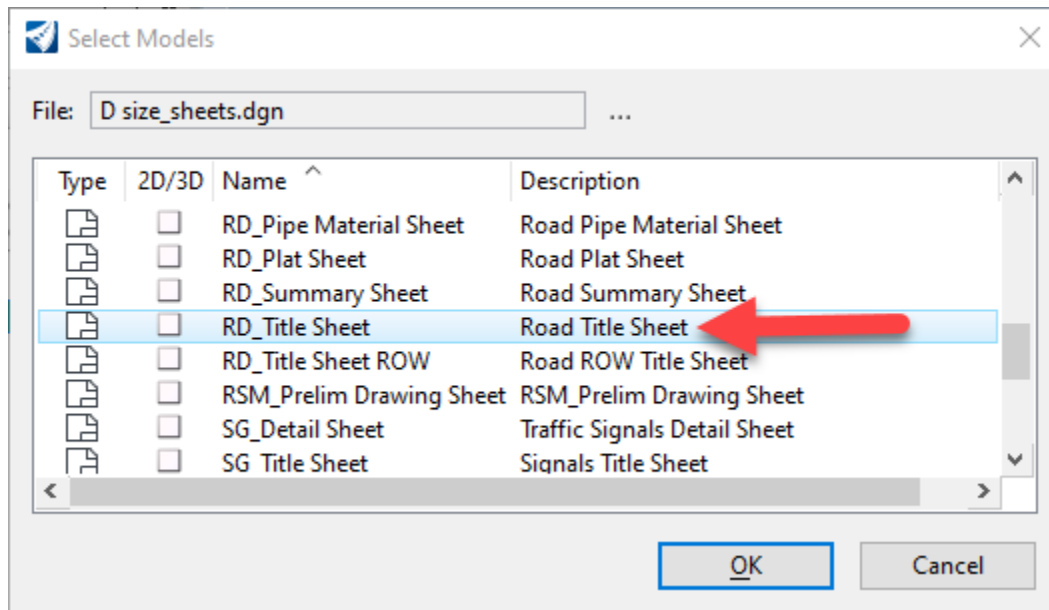
Import Models Button in Models Dialog

2. On the Import Model From File dialog that opens, navigate to the location of the D size_sheets.dgn file in ProjectWise and click Open.



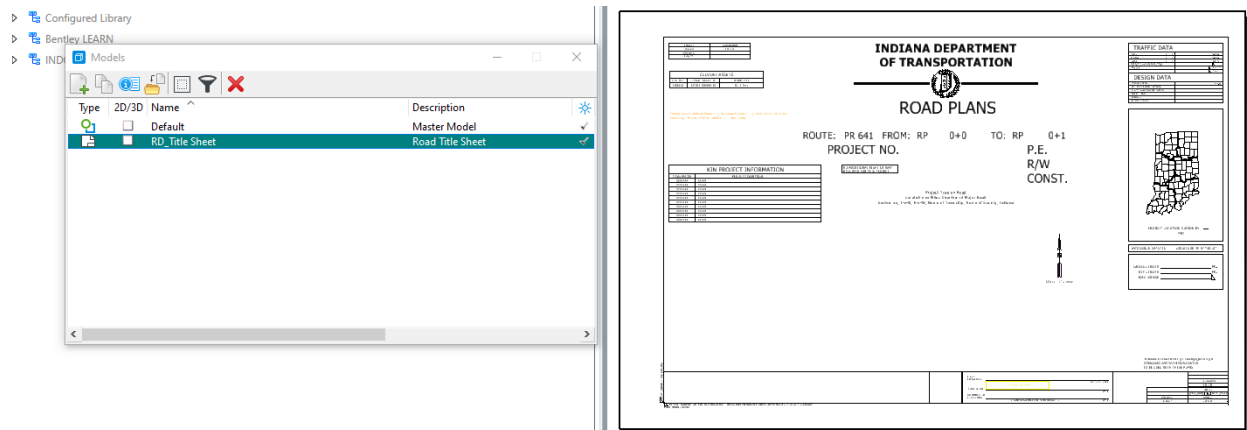
Selecting D size_sheets.dgn File

3. A Select Models dialog will then appear with a list of all the sheet models that reside within the D size_sheets.dgn file. Select the appropriate title sheet model in this list and click OK. For this example, we will select the RD_Title Sheet model.



Selecting Title Sheet Model from D size_sheets.dgn File

4. A new title sheet model will now be placed into your file.



Title Sheet Model

There are a couple areas of the title sheet to note. At the bottom right-hand corner, you will see the project Des Number, Contract Number, and Project Number fields already populated. These fields automatically populate based on the properties of the project (“Work Area” in ProjectWise terms). A look at the document properties of the title sheet will show this information.

Universal Title Sheet

PLAN TYPE

DESCRIPTION:

LOCATION:

AREA ENG. COUNTY. NO.

PLANS PREPARED BY: PHONE NUMBER

PROJECT ROUTE

FROM RP TO RP AT RP

| | | |
|----------------------|----------------------|---------------------------------------|
| PROJ. NO. CONST | GROSS LENGTH | BRIDGE LENGTH |
| <input type="text"/> | <input type="text"/> | <input type="text"/> |
| PROJ. NO. PE | NET LENGTH | RDWY LENGTH |
| <input type="text"/> | <input type="text"/> | <input type="text"/> |
| PROJ. NO. RW | MAX. GRADE | TOTAL LENGTH |
| <input type="text"/> | <input type="text"/> | <input type="text" value="0.000000"/> |

BRIDGE FILE STRUCTURE NO.

| | | | |
|---|---|--------------------------------------|--------------------------------------|
| SPEC DATE | COUNTY | SURVEY BOOK | DESIGNATION |
| <input type="text"/> | <input type="text" value="Vigo"/> | <input type="text" value="ars"/> | <input type="text" value="0001350"/> |
| LATITUDE | LONGITUDE | CONTRACT | PROJECT |
| <input type="text" value="N 39°37'10"/> | <input type="text" value="W 87°38'10"/> | <input type="text" value="R-28177"/> | <input type="text" value="7654321"/> |

A.A.D.T. V.P.D.

A.A.D.T. V.P.D.

D.H.V. V.P.H.

DIRECTIONAL DIST. %

TRUCKS % D.H.V.

DESIGN SPEED: M.P.H.

PROJ. DES. CRIT.:

FUNC. CLASS.:

RURAL / URBAN:

TERRAIN:

ACCESS CONTROL:

Save Undo Close

11/11

| | |
|----------------|--------------------|
| TRANSPORTATION | |
| 5 DATED | |
| ANS | |
| DESIGNATION | 0001350 |
| SHEETS | |
| \$PAGE_NUM\$ | of \$TOTAL_PAGES\$ |
| CONTRACT | PROJECT |
| R-28177 | 7654321 |

Automatically Populated Information on Title Sheet

Then at the top right corner are the Traffic Data and Design Data tables. This information gets populated from the Attributes tab of the document properties. Note that if you have the title sheet open when you enter this information on the Attributes tab and save it, you will need to close and reopen the title sheet for the changes to take effect.

Universal Title Sheet

PLAN TYPE [Dropdown]

DESCRIPTION: Br Repl, Comp, Cont, Pres, Conc, Bulb T-Beam

LOCATION: Bridge over US 41, 4.62 miles S of I-70, SR 641 ramps over US 41 (SB), (PH IIA)

AREA ENG. COUNTY. NO. []

PLANS PREPARED BY: [] PHONE NUMBER []

PROJECT ROUTE PR 641

FROM RP TO RP AT RP

PROJ. NO. CONST GROSS LENGTH BRIDGE LENGTH

PROJ. NO. PE NET LENGTH ROWY LENGTH

PROJ. NO. RW MAX. GRADE TOTAL LENGTH

BRIDGE FILE test STRUCTURE NO. 08395

SPEC DATE COUNTY SURVEY BOOK DESIGNATION

LATITUDE LONGITUDE CONTRACT PROJECT

DESIGN SPEED: 55 M.P.H.

PROJ. DES. CRIT.: NEW CONSTRUCTIC

FUNC. CLASS.: MAJOR COLLECTOR

RURAL / URBAN: RURAL

TERRAIN: LEVEL

ACCESS CONTROL: FULL

TRAFFIC DATA

| | | |
|--------------------------|-----|------------|
| A.A.D.T. | () | V.P.D. |
| A.A.D.T. | () | V.P.D. |
| D.H.V | () | V.P.H. |
| DIRECTIONAL DISTRIBUTION | | % |
| TRUCKS | | % A.A.D.T. |
| | | % D.H.V. |

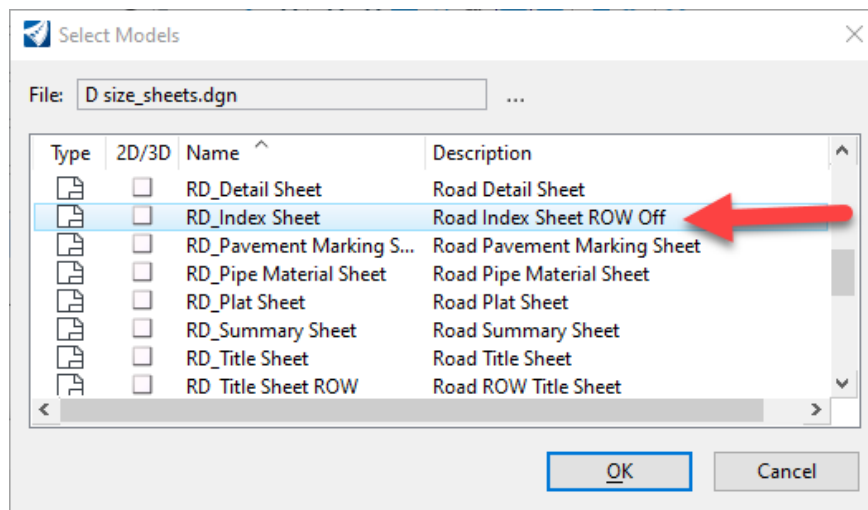
DESIGN DATA

| | |
|---------------------------|----------------------------|
| DESIGN SPEED | 55 M.P.H. |
| PROJECT DESIGN CRITERIA | NEW CONSTRUCTION (FREEWAY) |
| FUNCTIONAL CLASSIFICATION | MAJOR COLLECTOR |
| RURAL/URBAN | RURAL |
| TERRAIN | LEVEL |
| ACCESS CONTROL | FULL |

Populated Design Data Information from Attributes Tab

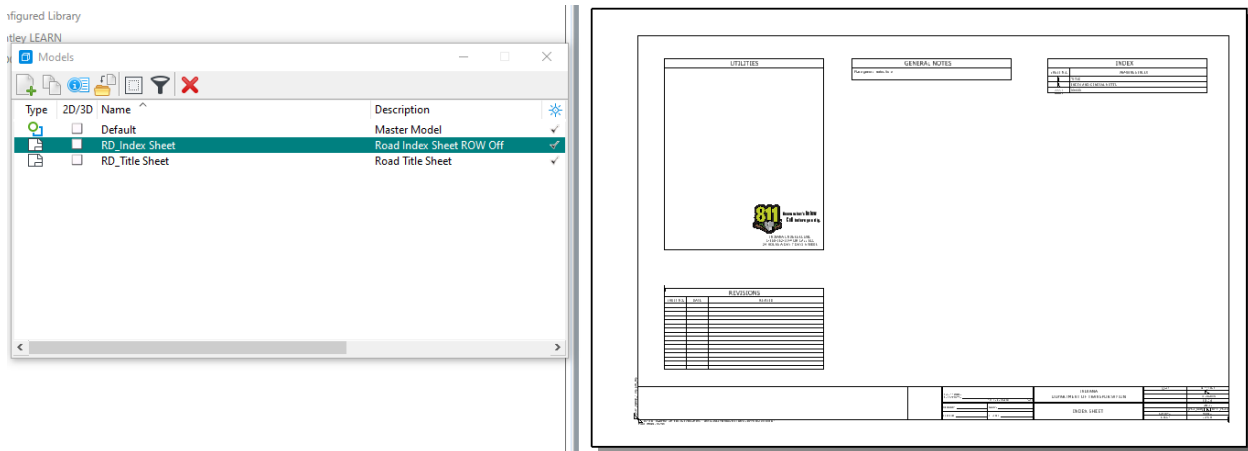
4.1-2 Creating an Index Sheet

To create an index sheet, you will perform the same initial steps as you do for the title sheet, where you create an index sheet file from a seed, and then proceed with the model import from D size_sheets.dgn. The only difference is that at the Select Models dialog, you will select the RD_Index Sheet model.



Selecting RD_Index Sheet Model

A new index sheet model will now be placed into your file.



Index Sheet Model

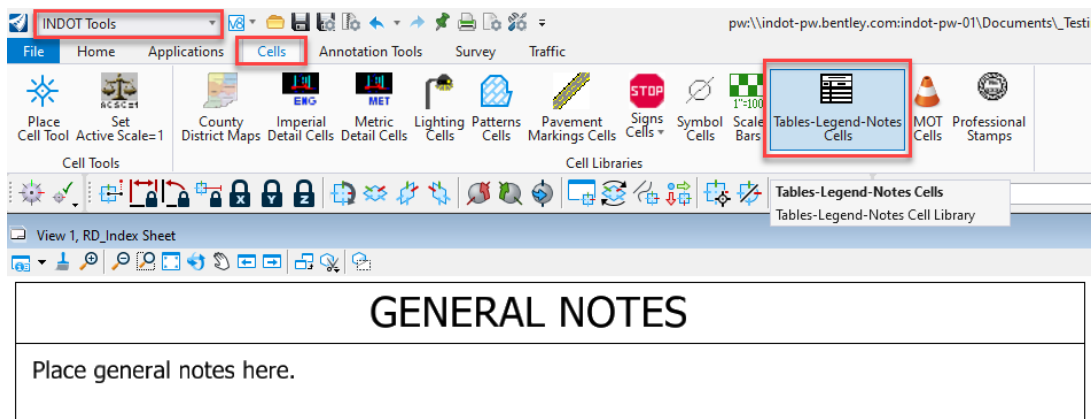
There are a couple areas of the index sheet to note. First is the Index table in the top right. A few rows are in the table initially. To add rows to the table, simply copy and paste the bottom row, as necessary.

| INDEX | |
|-----------|-------------------------|
| SHEET NO. | DRAWINGS INDEX |
| 1 | TITLE |
| 2 | INDEX AND GENERAL NOTES |
| ????? | XXXXX |

Cell: DS_MISCTBL WC \ Line
Level: Default

Copying Bottom Row of Index Table

Then for the General Notes table in the top middle section of the sheet, you can navigate to the [INDOT Tools](#) workflow, click on the [Cells](#) tab, and select the [Tables-Legend-Notes Cells](#) cell library to find the general notes that can be placed in this table.



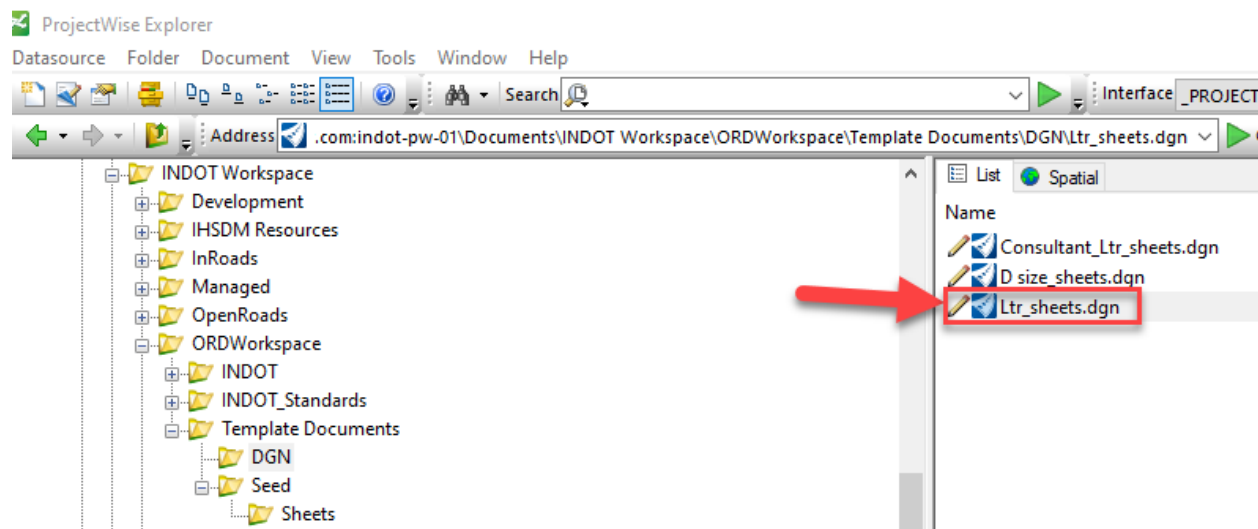
Adding General Notes

4.2 Resurface Plans

The following sections discuss MicroStation platform and Microsoft Excel resources to be used in the development of a set of resurface plans.

Resurface plans can be composed of one .dgn file with multiple sheet models, or several .dgn files each having a single sheet model. Regardless of the method that is used to create these plans, they should be produced using the 8.5" x 11" borders available in the Ltr_sheets.dgn template file.

pw:\\indot-pw.bentley.com:indot-pw-01\\Documents\\INDOT Workspace\\ORDWorkspace\\Template Documents\\DGN\\Ltr_sheets.dgn



Ltr_sheets.dgn Location

This file contains a title sheet model, and a set of four sheet models that can and should be used to develop each of the sheets in a set of Resurface Plans. These sheet models are:

- [Ltr. Title Sheet](#). This sheet model is the standard title sheet to be used with 8.5" x 11" plans.
- [Ltr. Detail](#). This sheet model is a standard, empty 8.5" x 11" border sheet oriented in portrait.
- [Ltr. Landscape Detail](#). This sheet model is a standard, empty 8.5" x 11" border sheet oriented in landscape.
- [Ltr. Detour Sheet Signing](#). This sheet model is available to be used for the Recommended Detour Signing sheet.
- [Ltr. Index](#). This sheet model is for index sheet content.

For the detail and index sheets, there is also a corresponding sheet model for the placement of an engineer stamp.

These plan sheets should follow all drafting standards as specified the [INDOT CAD Standards Manual](#), available for download from the [INDOT CAD Support web page](#). See the Indiana Design Manual for information regarding the sheet content.

4.2-1 Ltr. Title Sheet

This sheet model should be used as the title sheet for all plans created using the 8.5" x 11" format. This and all other sheet models in Ltr_sheets.dgn take advantage of attribute exchange information which allows population of fields using the Universal Title sheet.

While in the open file, import the sheet model titled Ltr. Title Sheet model from Ltr_Sheets.dgn. When you open the newly imported sheet model, it will appear as shown in the illustration below.

The illustration shows a title sheet form for the Indiana Department of Transportation. It includes a map of Indiana with a project location marked, a table of traffic data, a table of design data, and various project details. The form is titled "INDIANA DEPARTMENT OF TRANSPORTATION ROAD PLANS".

| TRAFFIC DATA | |
|--------------------------|----------------------------|
| A.A.D.T. (2026) | 96 V.P.D. |
| A.A.D.T. (2014) P.H.S. | 75 V.P.D. |
| D.H.V. (2014) | 3 V.P.H. |
| Directional Distribution | 50 |
| TRUCKS | 12% A.A.D.T. 85% D.H.V. |

| DESIGN DATA | |
|-------------------------|---------------------|
| DESIGN SPEED | 55 |
| PROJECT DESIGN CRITERIA | RURAL (NON-FREEWAY) |
| Functional Class | STATE COLLECTOR |
| RURAL/URBAN | RURAL |
| TERRAIN | ROLLING |
| ACCESS CONTROL | NONE |

CONTRACT NO. R-25542
INDIANA DEPARTMENT OF TRANSPORTATION
ROAD PLANS
PROJECT DESCRIPTION
Resurface Plans
PROJECT LOCATION
Local Rd From Katon Rd to US 41 and onto Ivy Tech Access Rd
GROSS LENGTH 1.0 MI.
NET LENGTH 1.0 MI.
PROJECT LOCATION SHOWN BY
Vign
DES. NO. 0001250
INDIANA DEPARTMENT OF TRANSPORTATION
Standard Specifications dated 2014
to be used with these plans.

PLANS PREPARED BY: Greg Carver
PHONE NUMBER: 867-5309
DATE: 8/15/2014
CERTIFIED BY: [Signature]
APPROVED FOR LETTING: INDIANA DEPARTMENT OF TRANSPORTATION
DATE: [Blank]

Ltr. Title Sheet Model

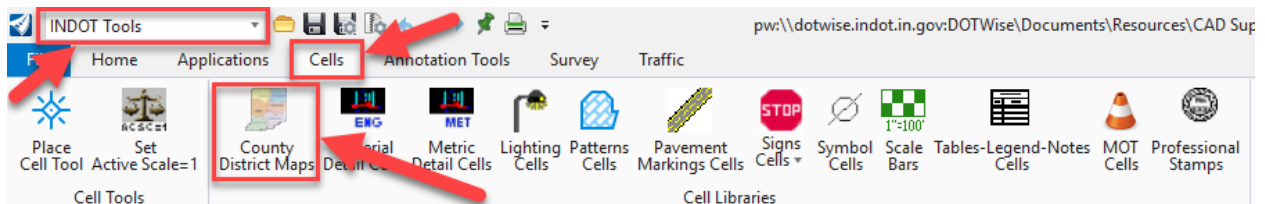
4.2-1a Placing the Location Map

Please refer to [section 3.2](#)—which covers the use of the INDOT Map Insert Application.

4.2-1b Placement of County Cells and Project Location Symbol

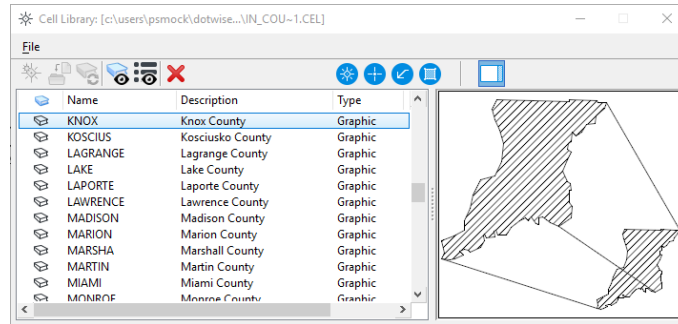
Placement of the county cell and project location symbol are accomplished by using the INDOT Tools workflow.

1. With the INDOT Tools workflow open, select the County District Maps tool in the Cells tab.



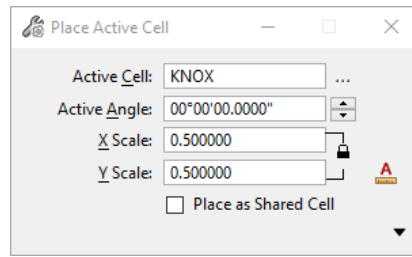
County District Maps Tool

2. Within the Cell Library, navigate to and double left mouse click on the appropriate county or counties.



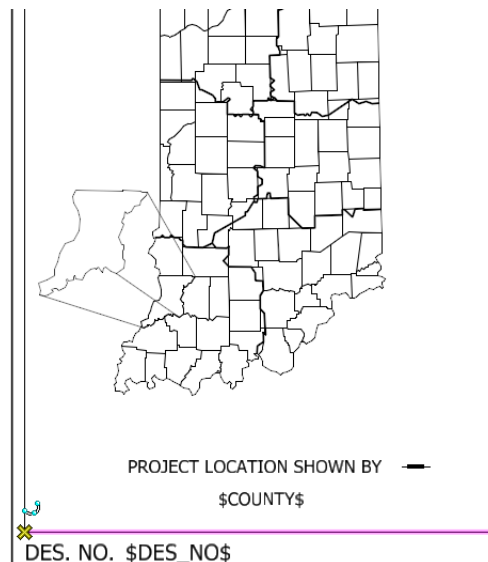
Selecting a County

3. For 8.5" x 11" plans, you will need to set the X and Y scales to 0.50



Setting the X and Y Scales

4. Place the active cell by using the lower left corner of the Project Location box as your hook point.



Placing the Cell

To place the location symbol, use MicroStation based commands to copy the symbol from within the Project Location box to its correct positioning.

PROJECT LOCATION SHOWN BY



Project Location Box

4.2-1c Universal Title Sheet

The Universal Title Sheet is used to populate portions of the 8.5" x 11" Title sheet. This information should only be edited using the Universal Title Sheet to ensure that that information is populated throughout the entire set of plans. For further information on the ProjectWise attributes panel and how to interact with it, please see the DOTWise 5.0 ProjectWise module.

The Universal Title Sheet is accessed within ProjectWise by selecting the Attributes Tab of the Properties dialog box of the design file (.dgn) and ensuring that the Interface is set to PROJECT INFORMATION

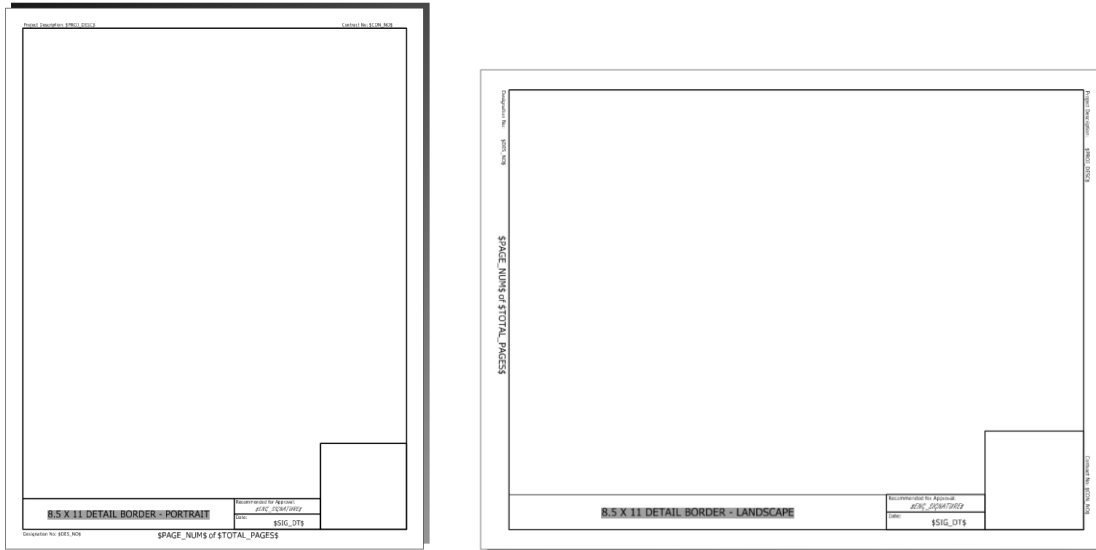
Universal Title Sheet

See Chapter 2 for more information regarding use of the Universal Title Sheet.

4.2-2 Ltr. Detail and Ltr. Landscape Detail

These sheet models are standard, empty 8.5" x 11" border sheets oriented in portrait and landscape. This border sheet can be used for any drawing detail or table in a set of resurface plans.

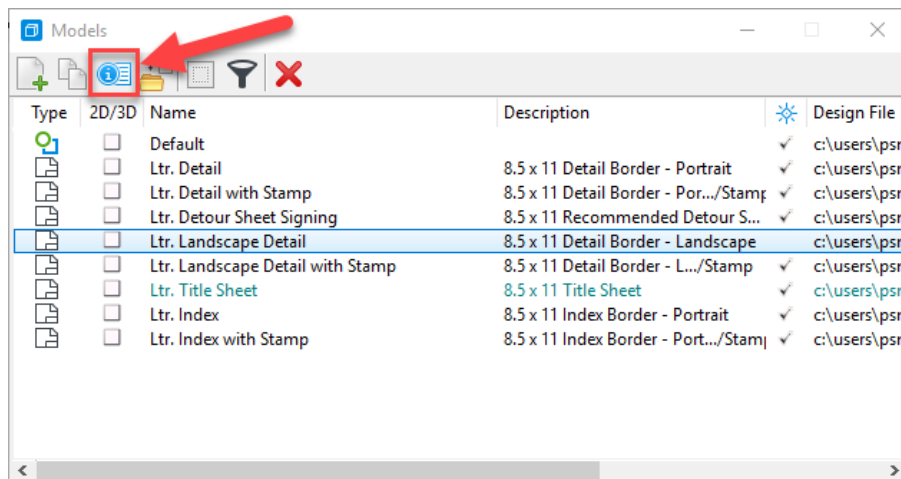
While in the open file, import the sheet model titled Ltr. Detail Model from Ltr_Sheets.dgn. When you open the newly imported sheet model, it will appear as shown below. Text outside of the border is populated with the Universal Title Sheet. The title of the sheet is edited by changing the description of the sheet model within the *Model Properties* dialog box. Draw or reference details into the area within the border.



Ltr Detail Sheets w/PE Stamp

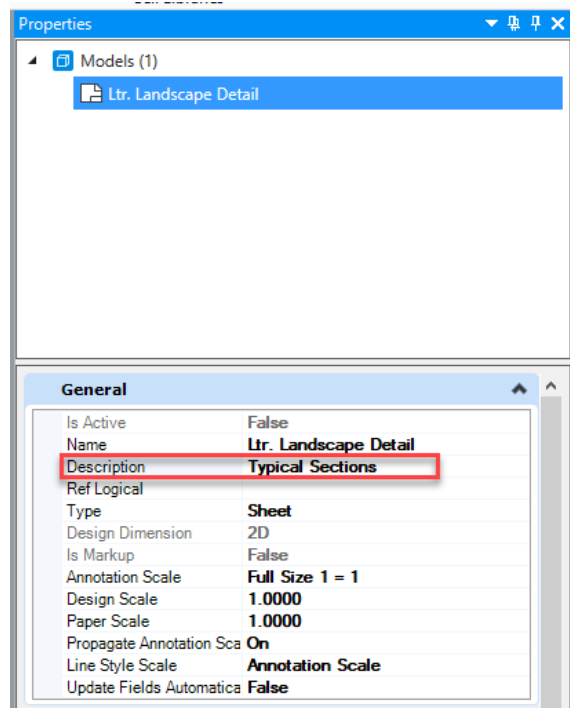
4.2-2a Editing the Sheet Title

1. Within the file (you do not need to be in the target sheet model) open the Properties dialog for the target sheet model by clicking on the Edit Model Properties button.



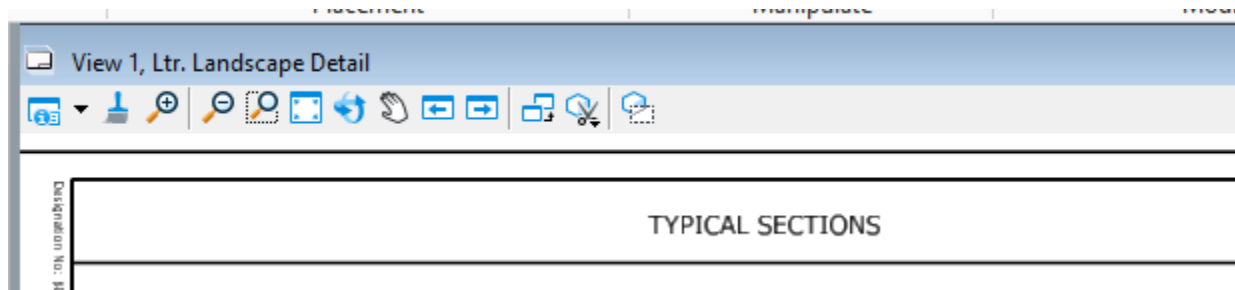
Edit Model Properties Button

2. In the Properties dialog that appears, edit the description of the sheet model to reflect the title of the drawing Detail.



Edit Description

3. The title change will be reflected in your sheet model.

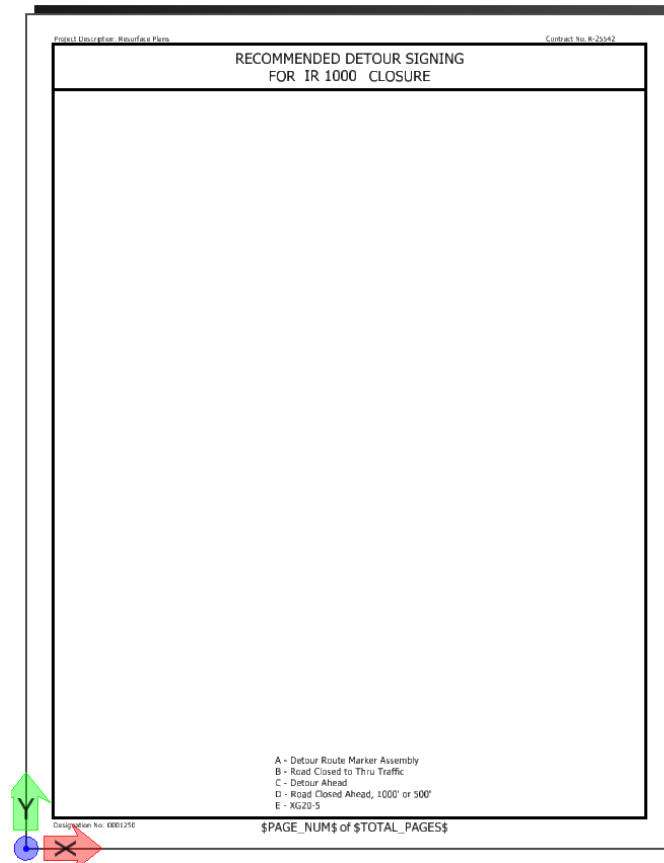


Changed Sheet Title

4.2-3 Ltr. Detour Sheet Signing

This sheet model was set up to be used for the Recommended Detour Signing sheet. This sheet model is pre-populated with a standard signing legend and uses the Universal Title Sheet to populate the route into the title of the sheet.

While in the open file, import the sheet model titled Ltr. Detour Sheet Signing from Ltr_Sheets.dgn. When you open the newly imported sheet model, it will appear as shown below.



Detour Signing Sheet

4.2-4 Miscellaneous Tables and Strip Maps

During the process of creating a set of plans on the 8.5" x 11" border sheets, you will need to add various summary tables and or strip map.

4.2-4a Miscellaneous Tables

INDOT has provided a template Microsoft Excel file that contains several different tables that are commonly used (and some not so commonly used) on resurface plans. These Excel tables have been formatted to be cut/pasted into the provided sheet models at a 1:1 scale.

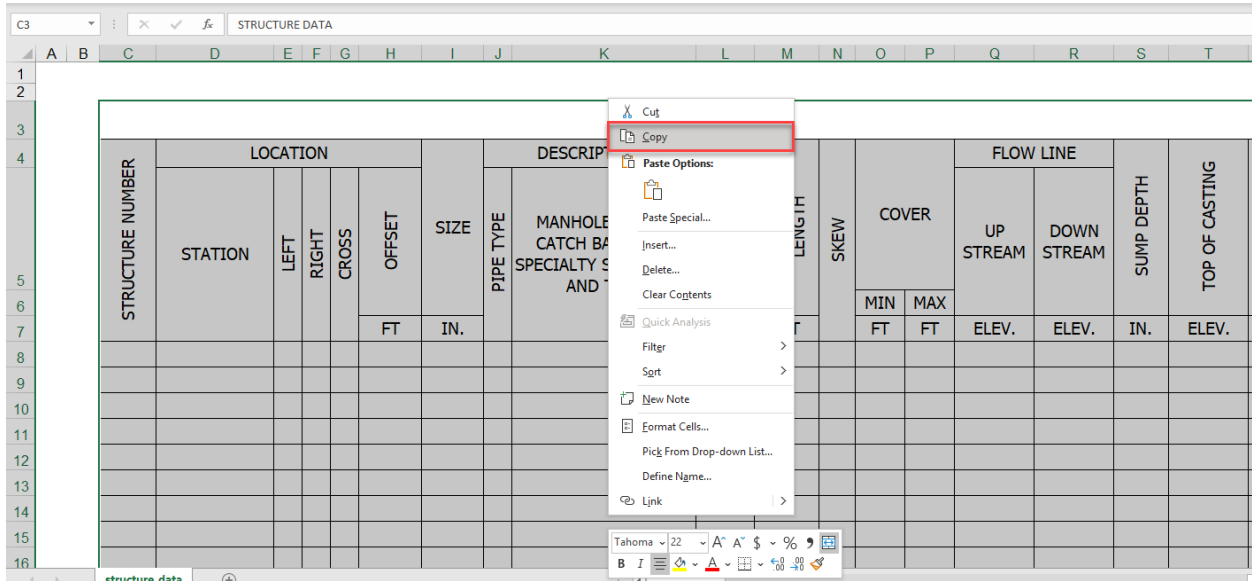
The Microsoft Excel Tables are available in ProjectWise at:

<pw:\\indot-pw.bentley.com:indot-pw-01\\Documents\\Template Documents\\Seed\\Spreadsheets\\>

Instructions for each table are included on each sheet within the Microsoft Excel file. Once completed, the tables can then be copied and pasted into a MicroStation sheet model.

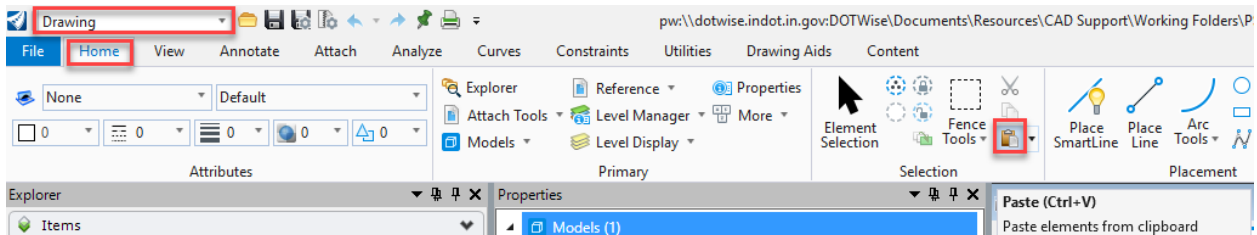
Copy and Paste Tables into Sheet Model.

1. Complete the Excel spreadsheet and select the area that you wish to copy into a sheet model. Then either *Right Click* → *Copy* with your mouse or enter *Ctrl + C* on your keyboard to copy that information.



Copy Table Contents from Excel

2. In the target sheet model, select the Paste tool from the Home tab of the Drawing workflow:



Paste Excel Data into the MicroStation Platform from Excel

3. Select the area in which you want to paste the table in the sheet model using tentative snaps. This will paste a picture of the table in the sheet model. This image is not editable. To edit the table, you will need to edit the spreadsheet file and then repeat the copy – paste operation.

[illegible]

Copied Excel Table

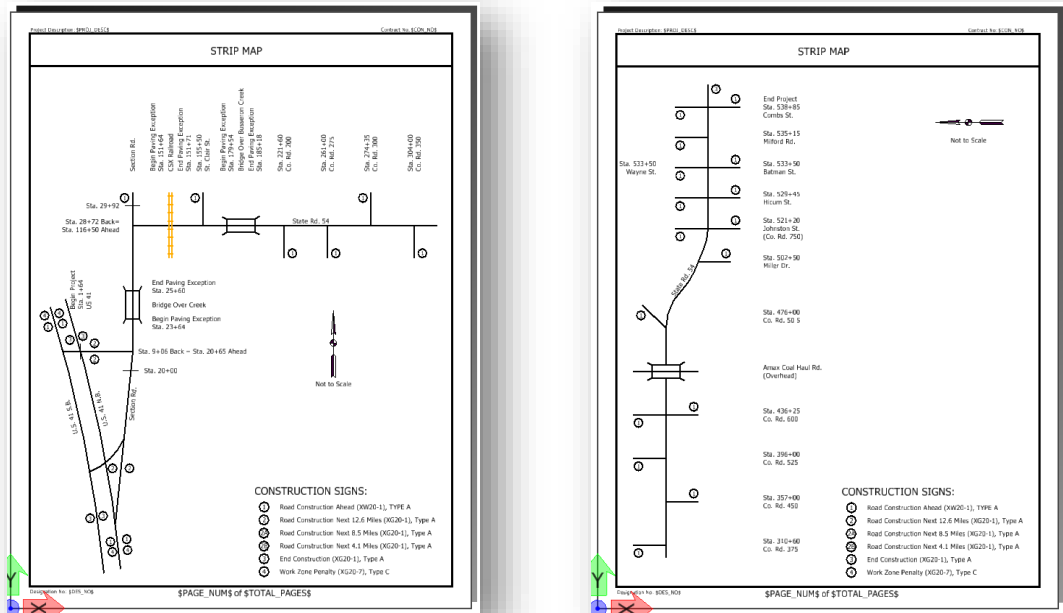
Due to ProjectWise functionality, it is highly recommended that users do not embed or link Excel sheets. There are two major issues that make these processes undesirable:

- **Embedding** – With an embedded spreadsheet, the CAD file must be open and then the Excel content opened from within the DGN. Additionally, one cannot link data across sheets with embedded Excel content.
- **Linking** – Due to the way ProjectWise functions with unique working directories for all users, linking will not work for any users other than the link creator.

4.2-4b Strip Maps

Additionally, as part of a set of Resurface Plans, per the [Indiana Design Manual](#), a Strip Map is required. This should also be created using the Ltr. Detail or Ltr. Landscape Detail sheet model(s).

Examples of a typical Strip Map are shown here.



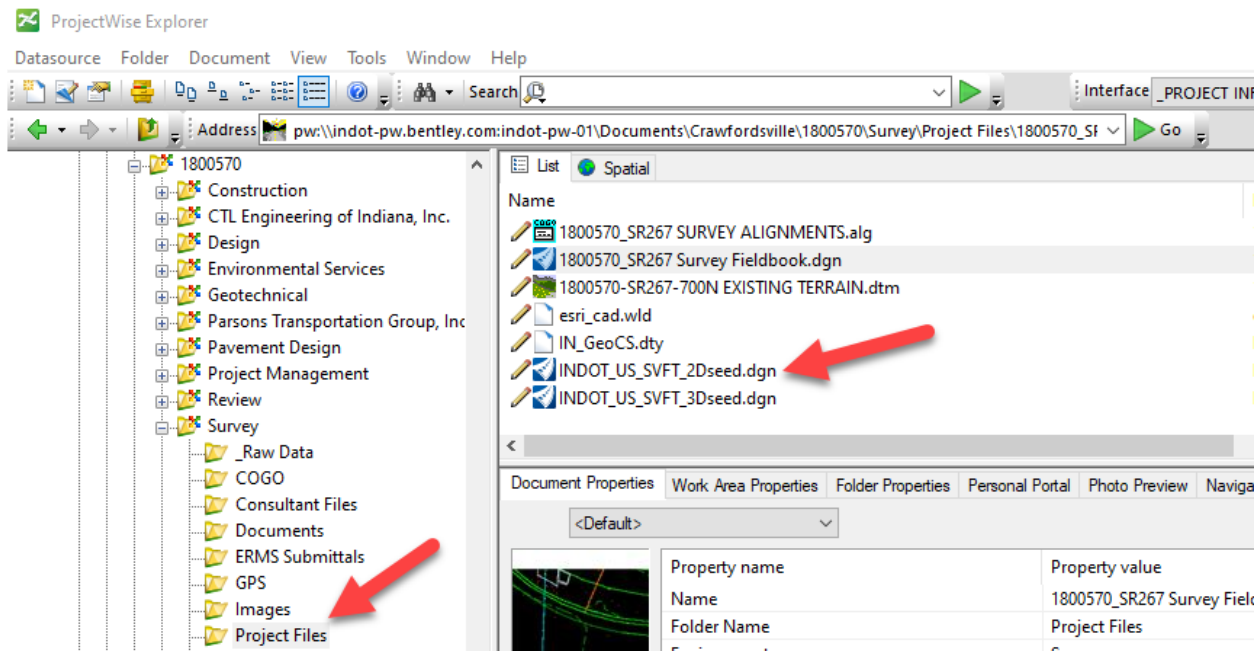
Strip Map Examples

4.3 Traffic Plans Production

4.3-1 Signs Signals and Lighting Plans

The following sections discuss MicroStation Platform resources to be used in the development of a set of Traffic plans for Signs Signals or Lighting.

Traffic plans will normally start from the [INDOT_US_SVFT_2Dseed.dgn](#) seed file located in ProjectWise. For more recent surveys, a geocoordinated version of one of these files will be found in the Survey Project Files folder.



Example Geocoordinated Seed Location

The previous screen capture shows an illustration of where you might find the geocoordinated seed files if your project has been setup. This should be the first location where seed files should be located. If there is no survey data and the project has not been geocoordinated, the files will need to be selected from the Template Documents location shown below. Regardless which file is being created, it is highly recommended to use the Advanced Document Creation Wizard.

Additional seed files can be found at [pw:\\indot-pw.bentley.com:indot-pw-01\\Documents\\Template Documents\\ORD-Connect Seed\\](#) in the event an appropriate seed has not been provided.

Note: For information on creating documents from the appropriate seed files in the DOTWise system, please see the INDOTWise 5.0 DOTWise ProjectWise module with discussion on the procedure, and section 1.1 CAD Seed/Template Files for specific information on the files that should be used.

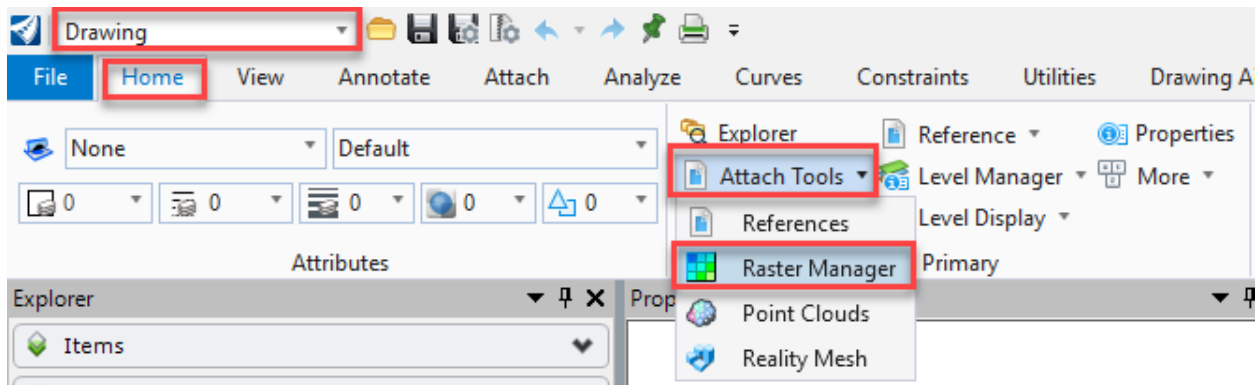
4.3-2 Traffic Plans Creation

With a template document now created, the Traffic Plans can start being assembled. The first portion of the Traffic Plan composition is the creation of the project title sheet. The first method of creation will be from pre-existing plan images.

4.3-2a Creating the Design from As-Built Plan Image

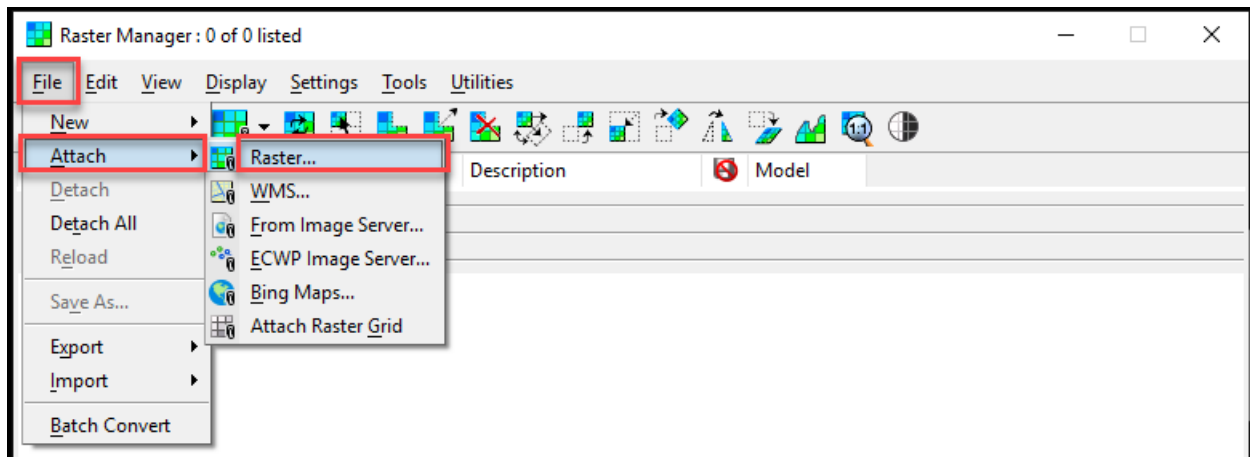
To start this process, first go back to the DGN that was created earlier in this section, Des#_Traffic Signal Plans.dgn. Open the file from ProjectWise and switch to a new model. For more details on creating/editing models, please refer to Appendix C of this document, or the application help file.

In a new model, start by opening the Raster Manager. This can be found in the Attach Tools dropdown under the Home tab of the Drawing workflow.



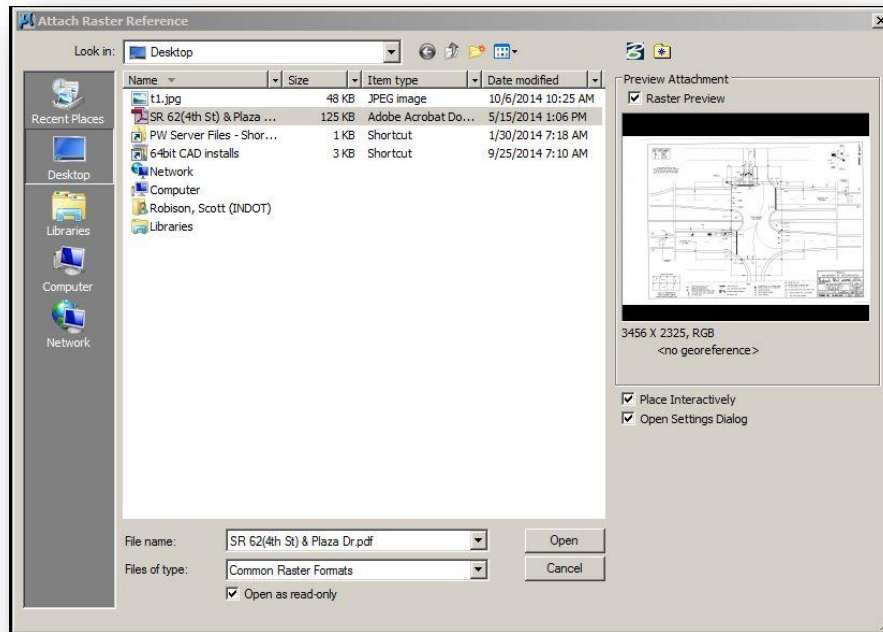
Start Raster Manager

After initiating the Raster Manager, the Raster Manager dialog will be displayed. On this dialog, select the Attach > Raster... command from the File menu:



Attaching a Raster

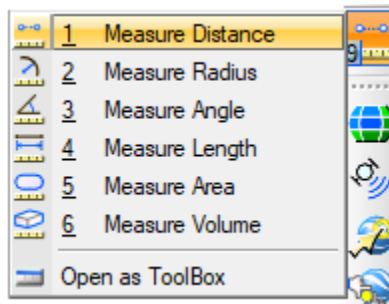
Next, locate the scanned/PDF copy of the As Built Plans for the project. As with most other project deliverables, these should be uploaded to ProjectWise for easy location, management, and security.



Locating the As Built Reference

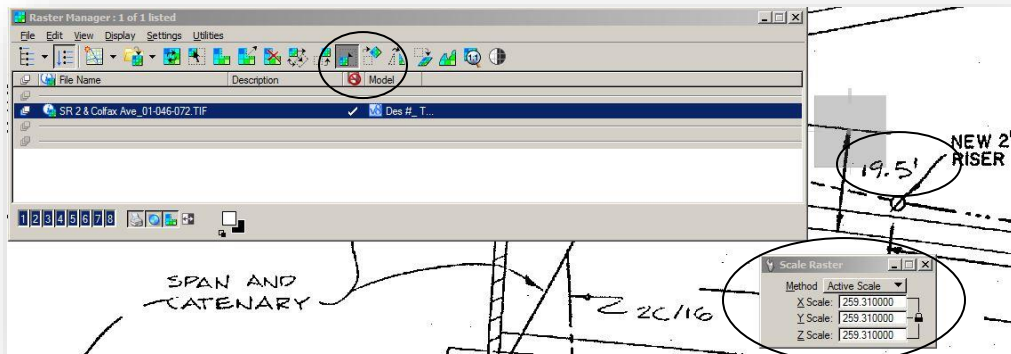
During the attachment process, make sure that the Raster is attached at a 1:1 scale. It is very important that the raster be attached this way to determine the necessary scale factor to rescale the raster by.

At this time, scaling of the As Built needs determined to draft the elements true scale. To determine the scale, locate some of the dimensioned elements on the raster and measure them using the application measurement tools.



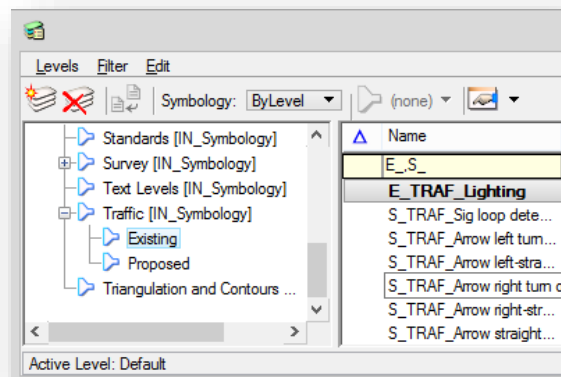
Measurement Tools

To determine the scale factor needed to upscale the raster by, take the as dimensioned measurement from the drawing and divide it by the measured value using the tools. For example, the following illustration shows a dimensioned line that is listed at 19.5'. The MicroStation tools measured this to be displayed as 0.0752'. To calculate the scale factor, divide the dimensioned by the measured ($19.5'/0.0752'$) resulting in a scale factor of 259.31.

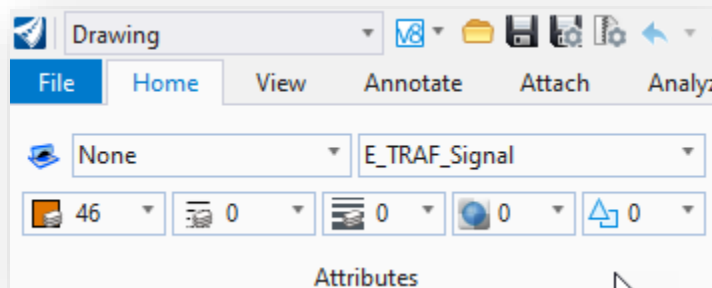


Raster Scaling

With the raster now scaled properly, one can now start drafting based on the As Built raster. Using the standard MicroStation drawing and Level tools, trace the geometry on the appropriate levels as provided in the DGNLib. These levels include the _TRAF_ prefix and can be filtered using the DGNLib filters as shown.

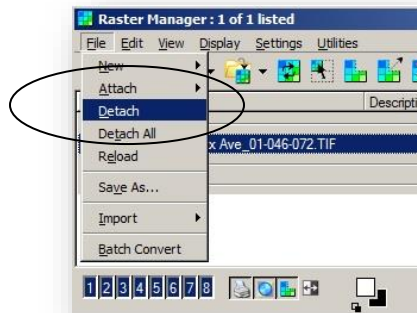


Traffic Proposed and Existing Filters



Setting the Active Level, Color, and Linestyle

Once completed tracing the As Built information, the Raster Image can be detached. Do so by opening the Raster Manager, and highlighting the As Built, and either Right Click -> Detach, or from the File -> Detach menu option shown below.



Detaching a Raster

At this point, the Traffic Plans should be completed using standard MicroStation tools. Later in this chapter, a review of sheet creation will occur. First however, brief explanations of alternate plan creation methods will be discussed.

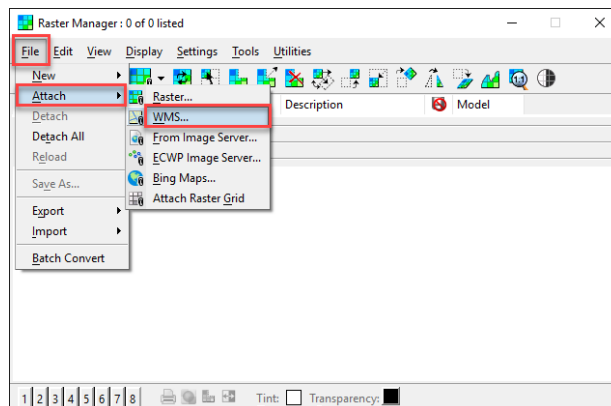
4.3-2b Creating Traffic Plans Without As Builts

In many projects, it is quite common to start a project without any As Built data. In this instance, alternate sources of data can be used to have a raster image background from which the geometry can be traced.

As with the previous section, start by creating a new model. Once prepared, start the Raster Manager as discussed in the previous section.

In this instance, an As Built will not be available. In lieu of this, the INDOT GIS department has made available a listing of WMS Web Map Services. These map services were discussed previously in section 3.1 Introduction to WMS, however a brief overview of the attachment process is provided here.

The first step is to select the *File -> Attach -> WMS*:



Attaching a WMS Map

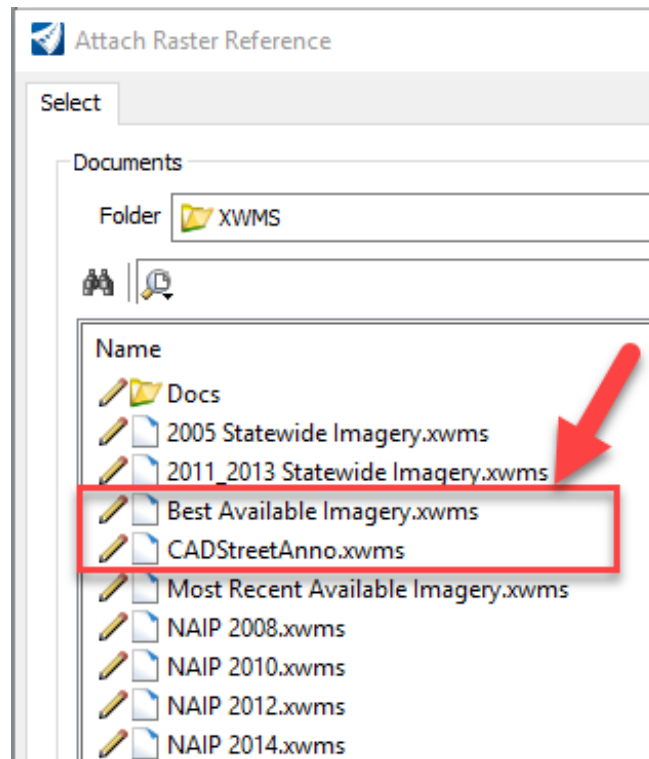
On the presented Attach Raster Reference dialog, navigate to the [XWMS](#) folder in ProjectWise. This folder is located at:

[pw:\\indot-pw.bentley.com:indot-pw-01\Documents\Resources\XWMS\](#)

Select the *CADStreetAnno.xwms*, and the *Best Available Imagery.xwms* and select OK. Please note that the GIS staff is constantly acquiring and processing new imagery, so newer versions of these maps may be available, especially the Full Res images. Check often if new images have been made available.

Note: When using the rasters, the following issues may be encountered:

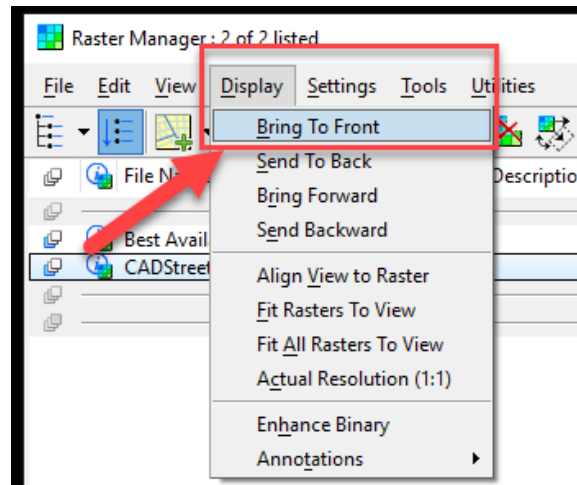
- 1. The Best Available Imagery.xwms may have performance issues during usage. This is a known issue and cannot be resolved by CAD or GIS Support staffs.*
- 2. The Orthos Full Res 2005.xwms perform very well but are out of date.*
- 3. Each set of rasters has benefits and disadvantages, use the Orthos that fit your project needs for the best experience.*
- 4. The plotting of raster images within 3D models presents some known issues. If you know you will be plotting such images for use on plan sheets, only use a 2D seed file when creating your base sheets.*



WMS Raster Attachment

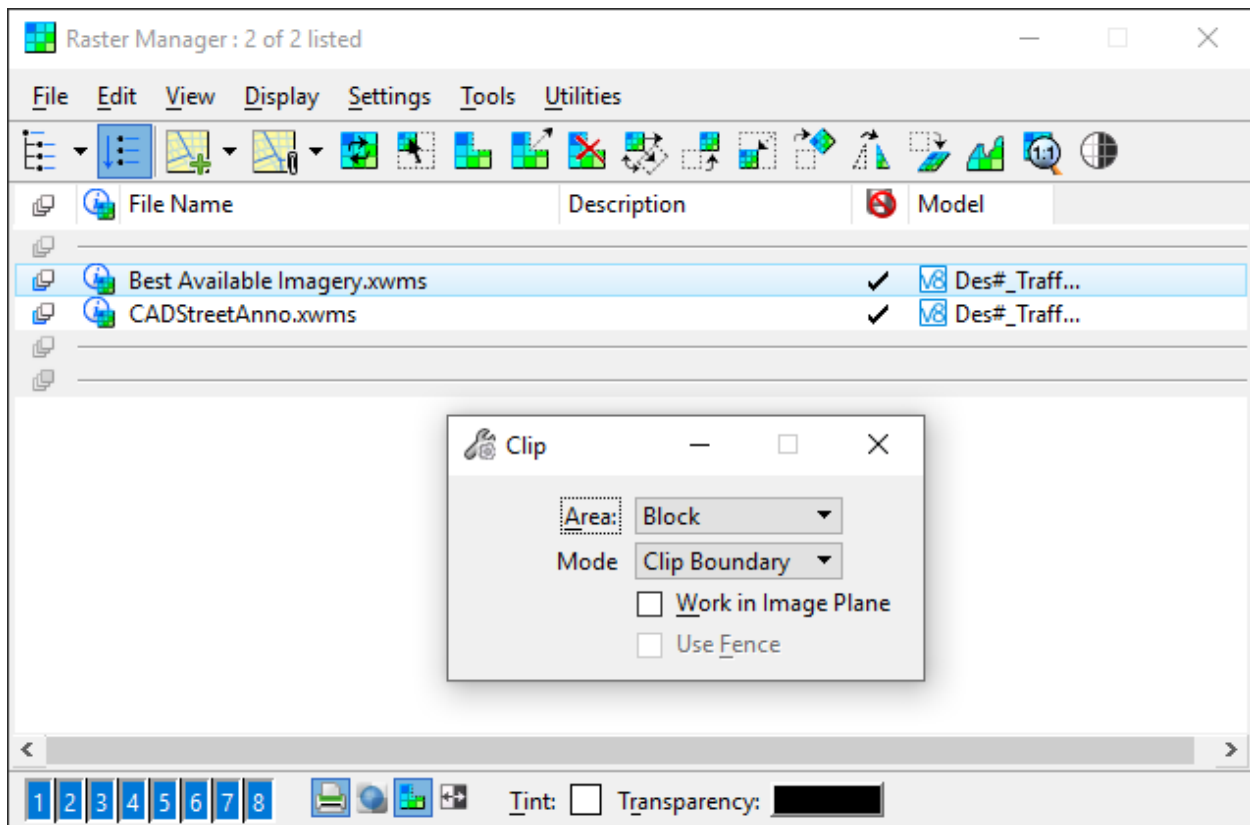
With the images now attached, MicroStation will start streaming the images based on where your view is located. It is highly recommended to zoom all the way out, so the entire state map is visible, and then Zoom down to the intersection.

With the location of the intersection found, go back to the Raster Manager. Highlight the CADStreetAnno.xwms, and then select *Display -> Bring to Front* from the Raster Manager toolbar.

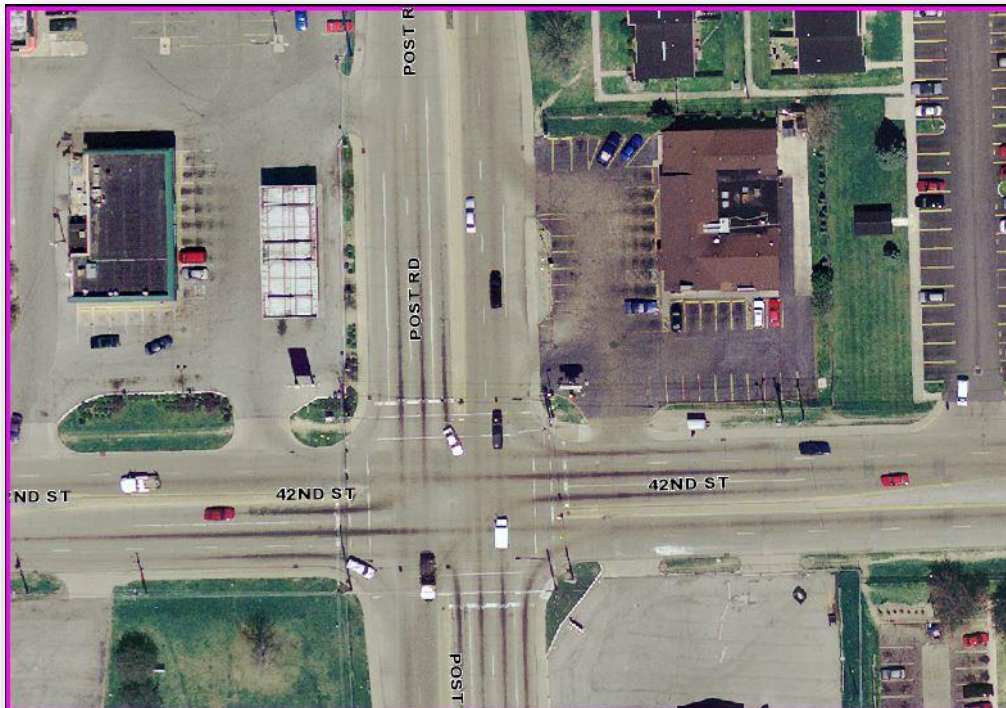


Bringing the CADStreetAnno.xwms to the Front

At this time, the extraneous raster imagery needs cropped out. Select the Clip tool from the Raster Manager toolbar and then crop the rasters to just the needed area.

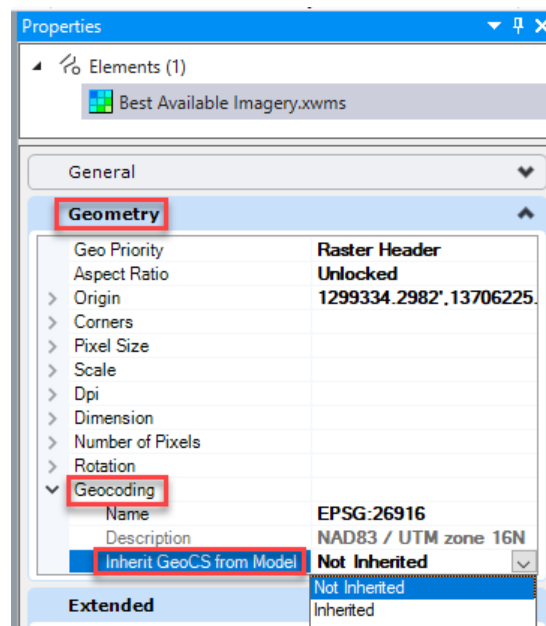


Raster Clipping



Clipped Raster

Next, the rasters need to have their geolocation enabled so they display in the correct spot on the DGN. To do so, view the Properties of the rasters, and set the “Inherit GeoCS from Model” setting under Geometry > Geocoding to Not Inherited (as shown below), so that image falls into place.



Setting the GeoCS to Not Inherited

At this point, the plan development process is the same as in the previous example. Trace the geometry using the appropriate symbology and detach the rasters when completed.

4.3-2c Traffic Plans when Survey or Design Data is Available

In this instance, the traffic plans process will start from pre-existing data directly in a MicroStation format. As was discussed earlier in this chapter, the first place to look for a seed file in this instance will be under the *Survey\Project Files* folder for the project.

At this time, the Survey Geometry can be used directly from the TOPO drawings. Note that there are a variety of methods to get and use this data:

- The data can be referenced and traced.
- The data can be referenced and merged.
- The data can be referenced and copied directly.

Depending on the method chosen, the data must be modified to the appropriate symbology for Traffic Plans and the development process can occur.

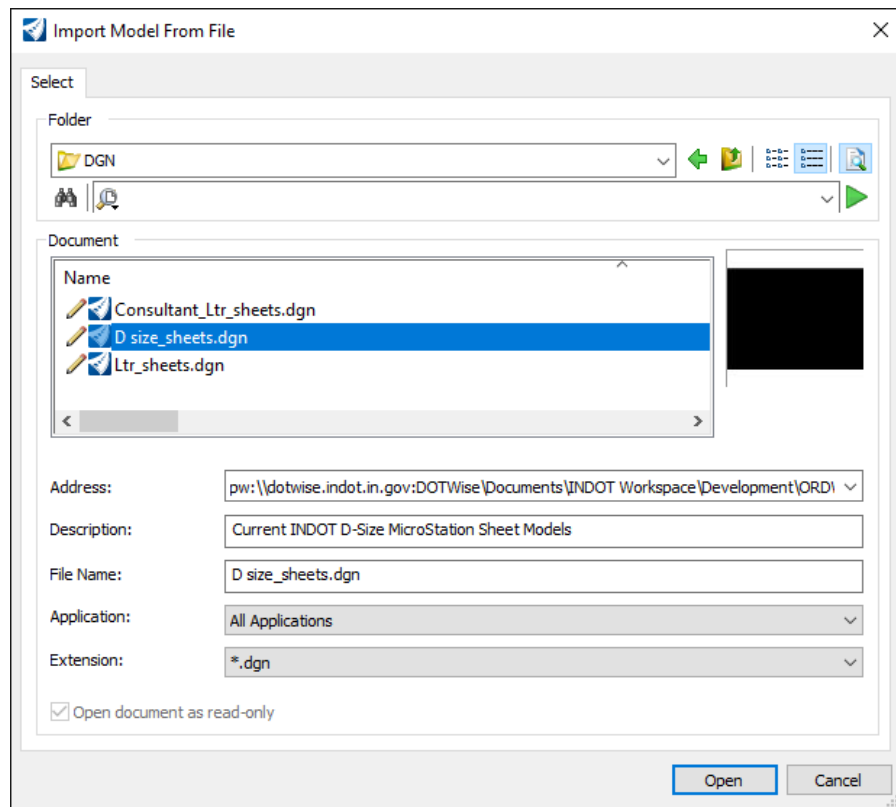
The above processes are also valid when working on Traffic Plans that are part of a broader Design project. In this instance, instead of using the TOPO, the pavement markings will be used in the same fashion listed above.

At this point for all 3 methods, it is time to take the created Traffic Plan and place it appropriately in a MicroStation border.

4.3-2d Creating the Detail Sheet

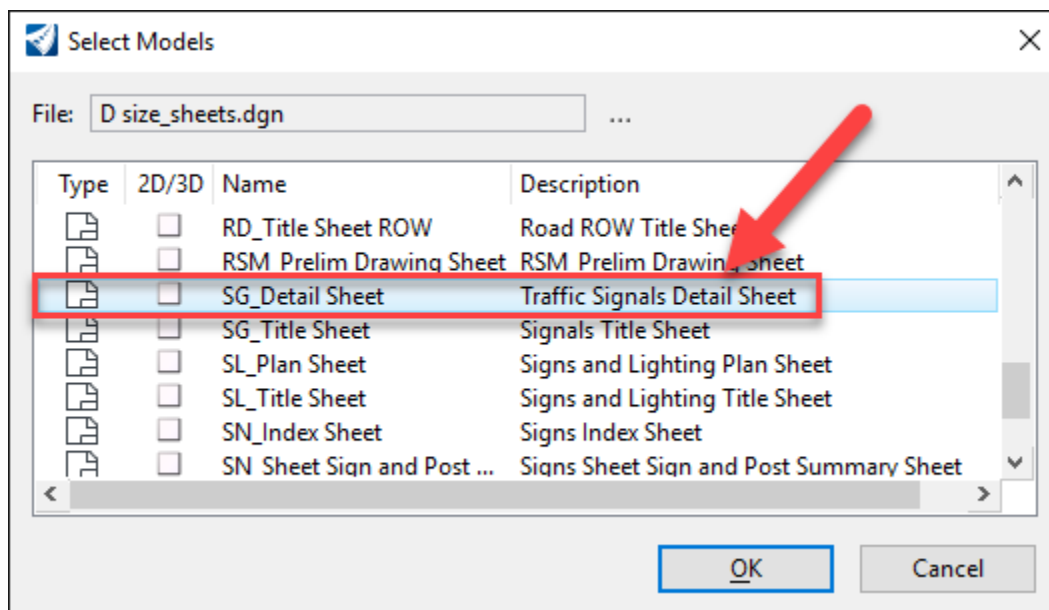
The final step for completing the Traffic Plans is the creation of the Detail Sheet for the project. Working out of the Signals Plan drawing, import a separate Arch D size sheet model using Models tool with appropriate sheet border. These borders can be found in the D_size_sheets.dgn located in ProjectWise at:

<pw:\\indot-pw.bentley.com:indot-pw-01\Documents\INDOT Workspace\ORDWorkspace\Template Documents\DGN\D size sheets.dgn>



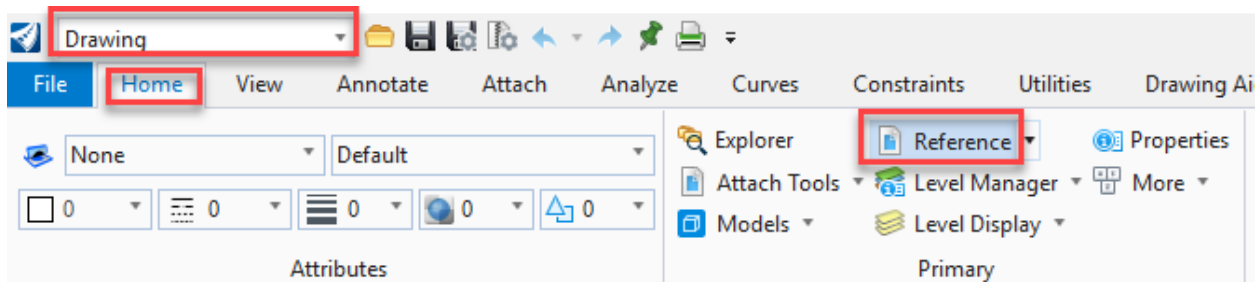
Locating the D_size_sheets.dgn

With the border file located and opened, select the appropriate border from the list to Import into the Open dgn. For example, the SG_Detail Sheet.



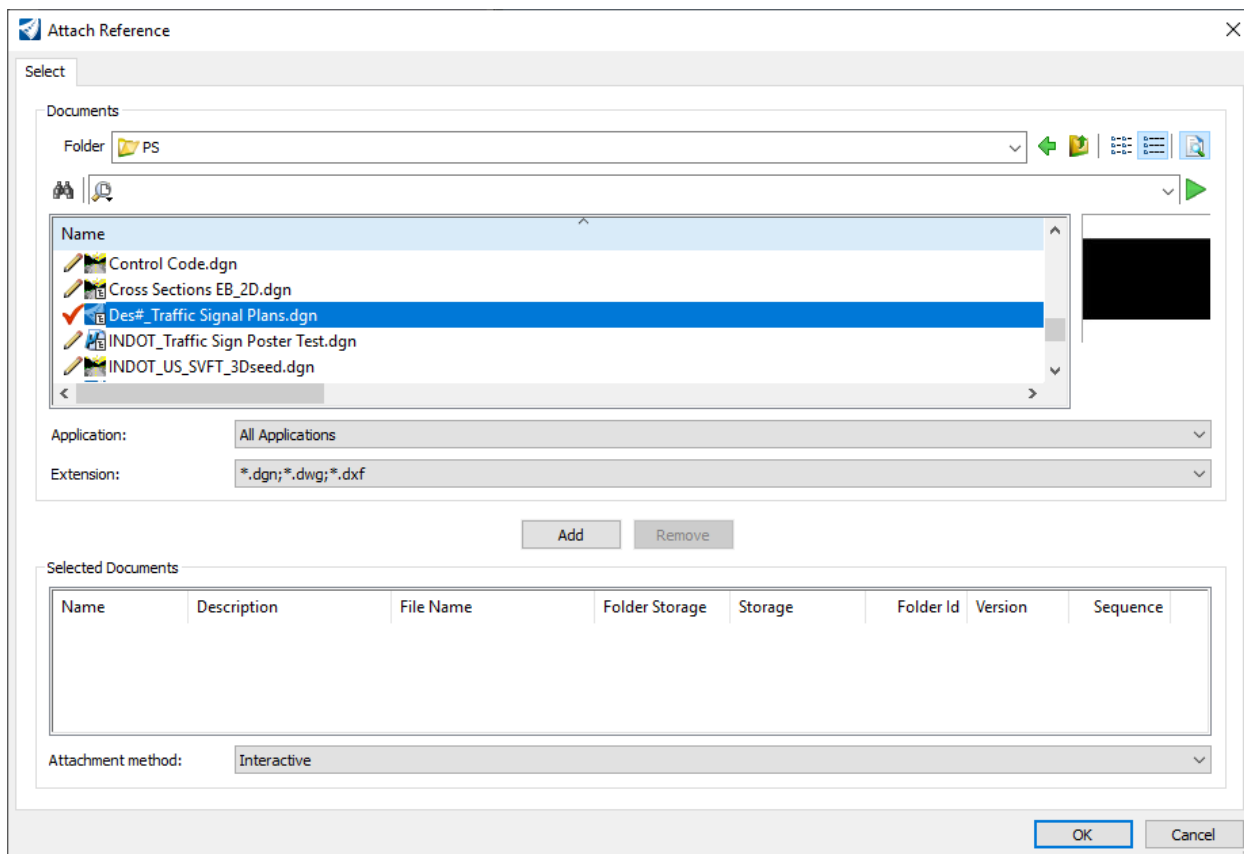
Selecting the Detail Model

This will bring a copy of the model into the active drawing. Select this newly imported model and open the Reference Attachment dialog from the Home tab of the Drawing workflow:



Attaching a Reference

Next, reference in the model containing the Intersection design as required to the appropriate scale (1"-20' or 1"-30' as per IDM). Note that an alternative method would be to drag and drop the model from the Models dialog to the References dialog.



Intersection Attachment

This concludes the Traffic Plans development process. At this time, the final file is prepared for plotting using the tools discussed in INDOTWise 5.0 Plotting manual.

4.4 MicroStation Drawing/Model Names

See the tables in this section for the recommended naming convention for various type of DGN drawings/model names. Please keep in mind that these can be applied to individual DGN models when one does not create a DGN for each file type.

Note: Please abbreviate DGN/model names as needed using the INDOT standard abbreviations (i.e., Sht – Sheet, MOT – Maintenance of Traffic, etc).

In the tables below, “nn” is used to denote the drawing number when there are multiple DGN’s (or sheet files) for the same type of drawing. Users should note that it is acceptable to create multiple sheet models within a single DGN, thus eliminating the need for multiple DGN’s with the same description/drawing file name.

| Description | Drawing File Name | Examples |
|--|-------------------------------|---|
| Road Project | | |
| Title Sheet | Sht Title.dgn | |
| Drawing Index and General Notes | Sht Index.dgn | |
| Typical Cross Sections | Sht Typical_nn.dgn | Sht Typical_07.dgn |
| Survey Route (Plat No. 1) | Sht Plat1_nn.dgn | Sht Plat1.dgn Sht Plat1_05.dgn |
| Survey Route Plat with Aerial Photography (Plat No. 3) | Sht Plat3_nn.dgn | Sht Plat3.dgn Sht Plat3_05.dgn |
| Geometric Tie-Up | Sht Geometric Tie_nn.dgn | Sht Geometric Tie.dgn Sht Geometric Tie_01.dgn |
| Traffic Maintenance Details | Sht MOT_nn.dgn | Sht MOT 02.dgn |
| Plan and Profile | Sht PlanProfile_scale_nn.dgn | Sht PlanProfile_50_01.dgn |
| Superelevation-Transition Diagram | Sht Super_nn.dgn | Sht Super.dgn Sht Super_01.dgn |
| Details | | |
| Construction Details | Sht Const Detail_scale_nn.dgn | Sht Const Detail_30_01.dgn |
| Intersection Details | Sht Intersection_scale_nn.dgn | Sht Intersection_30_01.dgn |
| Spot Elevation Details | Sht Spot Elev_nn.dgn | Sht Spot Elev.dgn Sht Spot Elev_01.dgn |
| Channel Details | Sht Channel_nn.dgn | Sht Channel_01.dgn |
| Geometric Details | Sht Geom Detail_nn.dgn | |
| Right-of-Way Details | Sht ROW Detail_nn.dgn | Sht ROW Detail.dgn Sht ROW Detail_01.dgn |
| Grading Plan | Sht Grading_scale_nn.dgn | Sht Grading_30_01.dgn |
| Drainage Details | Sht Drainage_nn.dgn | Sht Drainage_01.dgn |
| Erosion and Sediment Control Details (plan view) | Sht TEC_scale_nn.dgn | Sht TEC_30_01.dgn |
| Retaining Wall Details | Sht Retaining Wall_nn.dgn | Sht Retaining Wall.dgn Sht Retaining Wall_01.dgn |
| Wetland Mitigation Details | Sht Mitigation_scale_nn.dgn | Sht Mitigation_30_01.dgn |
| Traffic-Work Details | | |

| | | |
|---|---|---|
| Signs (if separate traffic-sign plans are not required) | Sht Signs_nn.dgn | Sht Signs.dgn Sht Signs_01.dgn |
| Signals | Sht Signal_scale_nn.dgn | Sht Signal_30_02.dgn |
| Lighting (if separate lighting plans are not required) | Sht Lighting_nn.dgn | Sht Lighting.dgn Sht Lighting_01.dgn |
| Pavement Markings | Sht Pvmnt Markings_scale_nn.dgn | Sht Pvmnt Markings_30_03.dgn |
| Road Summary Sheet | Sht Road Summary.dgn | |
| Description | Drawing File Name | Examples |
| Bridge Project | | |
| Title Sheet | Sht Title.dgn | |
| Index | Sht Index.dgn | |
| Typical Cross Sections | Sht Typical Cross Sections.dgn | |
| Traffic Maintenance Details | Sht MOT_nn.dgn | Sht MOT_02.dgn |
| Traffic Detour Details | Sht Detour_nn.dgn | |
| Temporary Runaround Details | Sht Runaround_scale_nn.dgn | Sht Runaround_50_02.dgn |
| Road Plan and Profile | Sht PlanProfile_scale_nn.dgn | Sht PlanProfile_50_01.dgn |
| Superelevation-Transition Diagram | Sht Super_nn.dgn | Sht Super.dgn Sht Super_01.dgn |
| Roadway Details (see Road Plan sheets) | | |
| Traffic-Work Details (see Road Plan sheets) | | |
| Soil Borings | Sht Borings TB_nn.dgn | Sht Borings TB_01.dgn |
| Channel Change Layout | Sht Channel_nn.dgn | Sht Channel_01.dgn |
| Layout | Sht Layout_scale_nn.dgn | Sht Layout_30_01.dgn |
| General Plan | Sht General Plan.dgn | |
| Structure Details | Sht Structure.dgn | |
| Abutment/Bent/Pier Details | Sht End Bent Details_nn.dgn Sht Pier No x_nn.dgn | Sht End Bent Details_02.dgn Sht Pier No 2 and 3_01.dgn |
| Framing Plan | Sht Framing Plan.dgn | |
| Structural Steel Details or Precast-Concrete Beam Details | Sht Beam Details_nn.dgn | Sht Beam Details_01.dgn |
| Bearing Details | Sht Bearings.dgn | |
| Superstructure/Floor Details | Sht Superstructure_nn.dgn | Sht Superstructure_02.dgn |
| Railing Details | Sht Railing Details.dgn | |
| Screeds | Sht Screed_nn.dgn | Sht Screed_02.dgn |
| Reinforced-Concrete Bridge Approach Details | Sht Approach Slab Details nn.dgn | Sht Approach Slab Details_02.dgn |
| Bridge Summary | Sht Bridge Summary.dgn | |
| Road Summary | Sht Road Summary. dgn | |
| Pipe Materials | Sht Materials.dgn | |
| Cross Sections | Sht Xsec_scale_nn.dgn | Sht Xsec_50_03.dgn |

| Description | Drawing File Name | Examples |
|------------------------------|--|--|
| Traffic-Signs Project | | |
| Title Sheet | Sht Title.dgn | |
| Index and General Notes | Sht Index.dgn | |
| Signing Plan | Sht Signing Plan_nn.dgn | Sht Signing Plan_01.dgn |
| Sign Layout | Sht Panel Sign Layout_nn.dgn Sht Sheet Sign Layout_nn.dgn | Sht Panel Sign Layout_01.dgn / Sht Sheet Sign Layout_01.dgn |
| Cross Sections | Sht Sign Cross Sections.dgn | |
| Sign Summary | Sht Panel Sign & Post Summary_nn.dgn Sht Sheet Sign & Post Summary_nn.dgn | Sht Panel Sign & Post Summary_01.dgn Sht Sheet Sign & Post Summary_01.dgn |
| Footing Details | Sht Signal Footing Details.dgn | |
| Structural Details | Sht Structural Details.dgn | |
| Signalization Project | | |
| Title Sheet | Sht Title.dgn | |
| Index and General Notes | Sht Index.dgn | |
| Signal Plan | Sht Signal Plan.dgn | Sht US 41 & SR 57 Signal Plan.dgn |
| Signal Details | Sht Signal Details.dgn | |
| Lighting Project | | |
| Title Sheet | Sht Title.dgn | |
| Index and General Notes | Sht Index.dgn | |
| Lighting Plan | Sht Lighting Plan.dgn | |
| Cross Sections | Sht Lighting Cross Sections.dgn | |
| Lighting Details | Sht Lighting Details.dgn | |

The following tables spell out the standard naming conventions for standard base drawings and sheet drawings, respectively.

| Standard Base Drawings | | |
|--------------------------------------|--|---------------------------------|
| Drawing Names / Logical Names | Descriptions / Reference Descriptions | Examples |
| Survey Alignment | Survey Centerline | Survey Alignment.dgn |
| Survey Section Corner | US Government Section Corners | Survey Section Corner.dgn |
| Survey Contours | Survey Existing Contours | Survey Contours.dgn |
| Survey Topography | Survey Existing Topography | Survey Topography.dgn |
| Survey Triangulation | Existing Triangulation | Survey Triangulation.dgn |
| Explan scale | Design Existing Topography | Explan 50.dgn Explan 100.dgn |
| Design Alignment | Design Alignment | Design Alignment.dgn |
| Prplan scale | Proposed Design Strings | Prplan 50.dgn Prplan 100.dgn |
| RW Existing scale | Existing Right of Way | RW Existing 50.dgn |

| | | |
|---------------------------------------|---|---|
| | | RW Existing 100.dgn |
| Annotate Alignment LineB scale | Proposed Alignment Annotation | Annotate alignment LineB 50.dgn Annotate alignment LineB 100.dgn |
| Annotate Survey Alignment LineB scale | Survey Alignment Annotation | Annotate survey alignment LineB 50.dgn |
| Annotate station offset LineB scale | Annotation of Survey points with station and offset | Annotate station offset LineB 50.dgn |
| Annotate survey points LineB scale | Annotation of Survey points | Annotate survey points LineB 50.dgn |

| <i>Standard Sheet Drawings</i> | | |
|--------------------------------|--|--|
| Drawing Names | Descriptions | Examples |
| Planprofile LineB scale n | Plan & profiles drawings | Planprofile LineB 50 001.dgn PlanProfile LineB 50 002.dgn PlanProfile LineB 50 n.dgn |
| Layout LineB scale n | Bridge layout sheet | Layout LineB 50 001.dgn Layout LineB 50 002.dgn Layout LineB 50 n.dgn |
| Const det LineB scale n | Construction details drawings | Const det LineB 50 001.dgn Const det LineB 50 002.dgn Const det LineB 50 n.dgn |
| Pvmt Markings scale n | Pavement marking details | Pvmt Markings 50.dgn Pvmt Markings 50 01.dgn Pvmt Markings 50 02.dgn Pvmt Markings 50 n.dgn |
| Runaround LineB scale n | Temporary Runaround plan profile drawings. | Runaround LineB 50 001.dgn Runaround LineB 50 002.dgn Runaround LineB 50 n.dgn |
| TEC det LineB scale n | Temporary Erosion Control details | TEC det LineB 50 01.dgn TEC det LineB 50 02.dgn TEC det LineB 50 n.dgn |
| Intersection Det scale n | Intersection details | Intersection det 50 n.dgn |

For the sheet drawings shown above, the alignment name, scale, and sheet number indicate which alignment, scale, and sheet number is reflected. Following this convention will allow easy differentiation between alignments and scales.

5. Working with References in the MicroStation Platform

This chapter will cover how to work with references in the plans production process. With the emphasis on the use of models in our plans production process, it is very important to understand how references are used to create design/sheet content.

5.1 Using References

Elements in a reference display as though they were in the active model. Although you cannot manipulate the elements in a reference, you can snap to them and even copy them into the active model.

The most common usage of references is in the creation of design compositions. Design compositions are used by engineers and other technical professionals to communicate through the visual content of their designs.

To create a *design composition* using MicroStation, you build a design model consisting of a working collection of references used in the performance of particular engineering tasks. For example, you may attach as references a collection of survey points as a guide for placement of additional geometry. Reference attachments in a design composition are usually coincident.

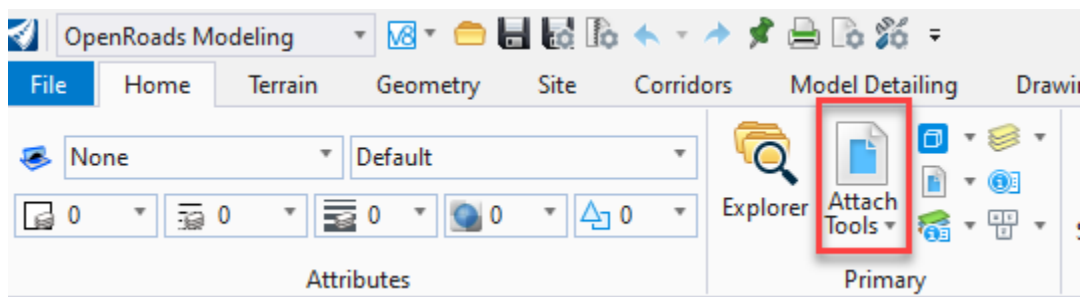
It is sometimes convenient to refer to one part of a model while drawing in another area by attaching the active model to itself.

Another common usage of references is in the creation of drawings for publication. This task is called drawing composition. Whereas a design composition is typically contained in a design model, a drawing is composed in a sheet model.

5.2 Attaching References

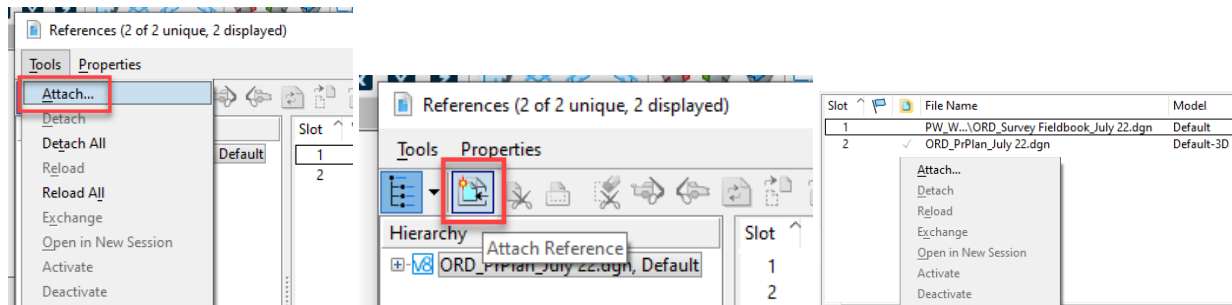
The most common way to attach a reference is to attach it with a Coincident – World orientation. This means that the global origin of the reference file will be matched to the global origin of the active file. With this orientation chosen, when a user snaps to elements in the attached reference, the coordinate information will be correct. To attach a reference with Coincident – World orientation, perform the following steps:

1. In the active file, click on the Attach Tools button in the Primary tool group of the Home tab in any workflow.



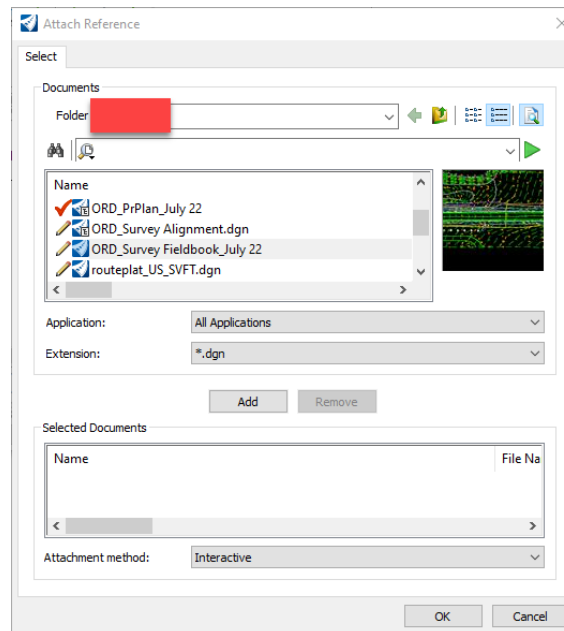
Attach Tools

- On the References dialog that appears, click on **Tools > Attach**. Alternatively, you can click on the Attach References button, or you can right-click in the Hierarchy or reference listing panes and choose the Attach option from the menu that appears.



Options to Attach a Reference

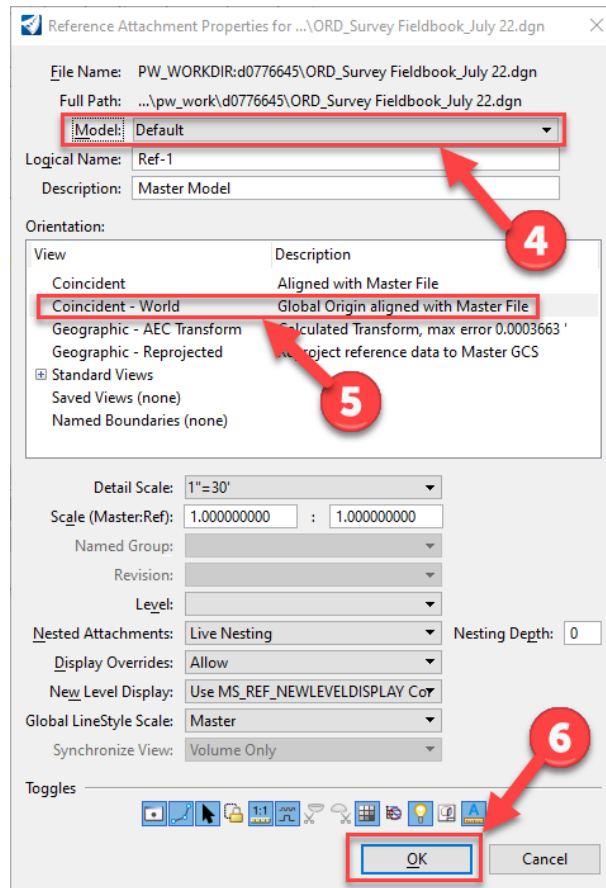
- On the Attach Reference dialog that appears, select the DGN file that contains the model you want to reference into the active file.



Attach Reference Dialog

- On the Reference Attachment Properties dialog that appears, note the Model setting. By default, the reference's master model is selected. If the model you want to reference into the active file is NOT the master model, select it from the dropdown list.
- In the Orientation section of the dialog, select the Coincident – World orientation if it is not already selected.

6. With the correct model and orientation selected, click OK to proceed with attaching the reference.



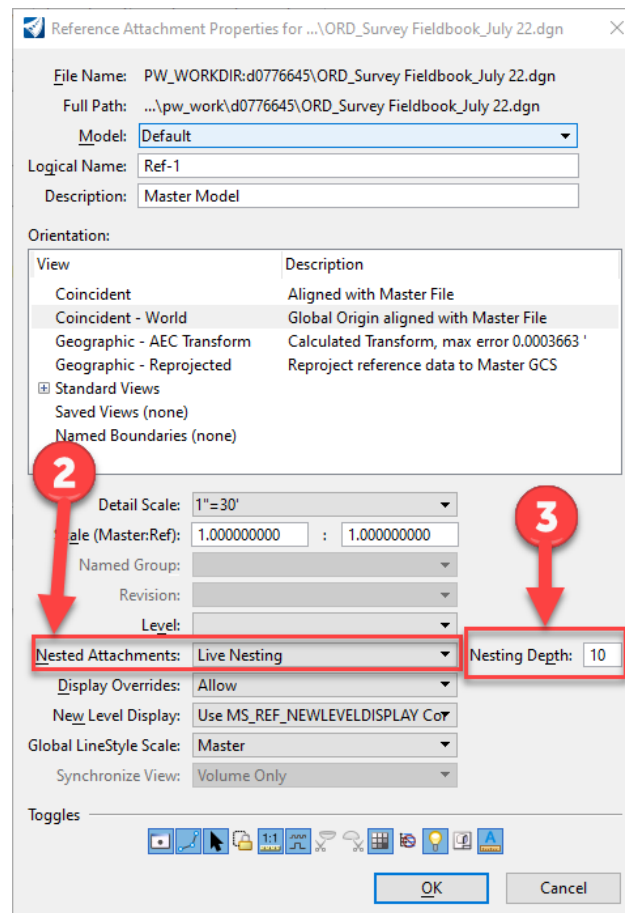
Reference Attachment Properties Dialog

5.3 Working with Nested References

When a MicroStation platform-based design file being used as a reference has its own attachments, they become nested references. The links between these files can be maintained through many levels (depths) of nesting, so that if you open only one file, you can view the contents of many files. The individual references can be updated, and the changes will be shown in the master (or parent) file. When you attach a parent reference to your model and turn on live nesting, you can also control how many levels of nested references are attached to the model.

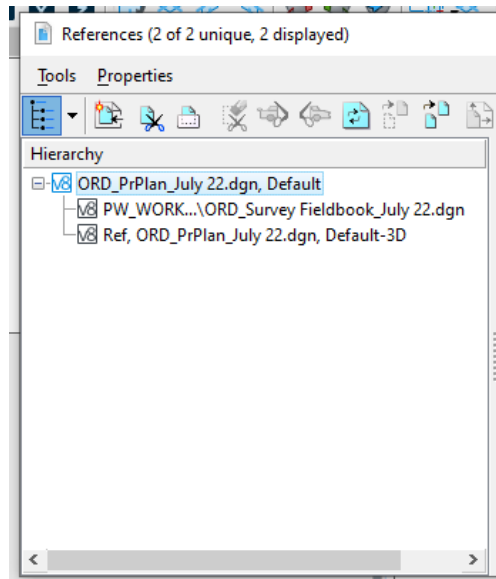
To attach a reference with live nesting turned on, perform the following steps:

1. Perform steps 1 through 3 from the previous section to open the References dialog and select the file containing the model you want to attach to your active file.
2. On the Reference Attachment Properties dialog, note the Nested Attachments setting. If not already selected by default, select the Live Nesting option.
3. For the Nesting Depth setting, enter a high number (for example, 10). Setting it to a high number will ensure that you include even the most deeply nested references.



Nested Attachments and Nesting Depth Settings

Once the reference is attached, pay attention to the Hierarchy pane of the References dialog. Note the hierarchical structure of this pane, as it is helpful to visualize the current nesting that is in place.



Hierarchy Pane of References Dialog

The Nested Attachments and Nesting Depth settings will be explained below in more detail.

Nested Attachments

This setting determines if referenced models attached to reference models (and so on) are recognized when a model is attached to the active model.

- No Nesting — Models attached to the attached model are not recognized in the active model.
- Live Nesting — Models attached to the attached model are recognized in the active model.
- Copy Attachments — Models attached to the attached model copied into the active model.

When working in a DWG or DXF file, live nesting is always on, and there is no limit to nest depth. Therefore, the Nested Attachments and Depth items are disabled. To control the display of nested attachments, use the Ignore Attachment When Live Nesting setting (on the Attachment Settings dialog box).

Nesting Depth

The Nesting Depth setting sets the number of levels of referenced models that are recognized. Models can have their own referenced models, which, in turn, can have more referenced models, and so on.

If the depth is set to 0, only the selected reference model is attached to the master model; referenced models in the referenced model are ignored.